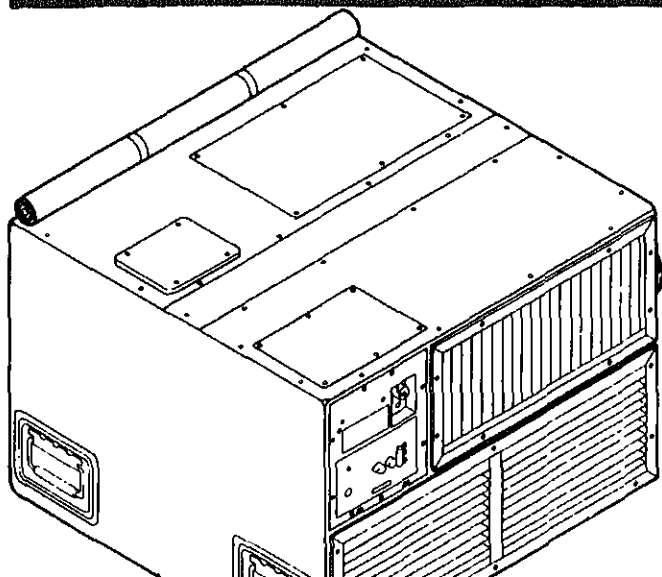


**OPERATOR'S, ORGANIZATIONAL,
DIRECT SUPPORT AND
GENERAL SUPPORT MAINTENANCE
MANUAL**

**AIR CONDITIONER, HORIZONTAL, COMPACT,
18,000 BTU/HR COOLING**

<u>MODEL</u>	<u>POWER</u>	<u>NSN</u>
8H	230V, Single Phase, 50/60 Hertz	4120-00-411-3729
8H-3	208V, 3 Phase, 50/60 Hertz	4120-01-076-1753
8H-4	208V, 3 Phase, 400 Hertz	4120-00-411-3731

This copy is a reprint which includes current
pages from Changes 1 through 3.



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Operating Instructions

Repair Parts, Service
and Preventive Maintenance

Troubleshooting

Organizational Maintenance

Direct and General
Support Maintenance

Preparation for
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AND HEADQUARTERS, U.S. MARINE CORPS
WASHINGTON, D.C., 22 April 1988

- Operator's, Organizational, Direct Support,
and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

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F18H	230V, Single Phase, 50/60 Hertz	4120-00-411-3729
F18H-3	208V, 3 Phase, 50/60 Hertz	4120-01-076-1753
K1F-18H-4	208V, 3 Phase, 400 Hertz	4120-01-177-5990
F18H-3A	208V, 3 Phase, 50/60 Hertz	4120-01-122-0626
F18H-4A	208V, 3 Phase, 400 Hertz	4120-01-122-0627

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By Order of the Secretaries of the Army and Navy (Including the Marine Corps).

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Chief of Staff

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Brigadier General, United States Army
The Adjutant General

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Naval Facilities Engineering Command

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To be distributed in accordance with DA Form 12-25A, Operator's, Unit, Direct Support and General Support Maintenance Requirements for Air Conditioner, Horizontal Compact, 18,000 BTU (F18H: 230V, 50/60HZ, 1PH; F18H-4A: 208V, 400HZ, 3PH; F18H-3 208V, 50/60HZ, 1PH; F18H-4: 108V, 400HZ, 3PH; F18H-3A: 208V, 50/60HZ, 3PH).

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WASHINGTON, D.C., 21 February

Operator's, Organizational, Direct Support,
and General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

MODEL	POWER	NSN
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WASHINGTON, D.C., 25 September 1984

Operator's, Organizational, Direct Support
And General Support Maintenance Manual

AIR CONDITIONER, HORIZONTAL, COMPACT, 18,000 BTU/HR COOLING

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vironmental Equipment Air Conditioners, 18,000 BTU, Compact.**

MARINE CORPS:

MARCORPS CODE: AGC



WARNING

HIGH VOLTAGE is used in the operation of this equipment.

DEATH ON CONTACT or severe injury may result if personnel fail to observe safety precautions.

Always disconnect the air conditioner from power source before performing maintenance on this equipment.

Do not operate the air conditioner without louvers, top covers, and guards in place and tightly secured.

WARNING

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

WARNING

REFRIGERANT UNDER PRESSURE is used in the operation of this equipment.

DEATH or severe injury may result if personnel fail to observe safety precautions.

Never use a heating torch on any part that contains refrigerant-22.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas.

WARNING

Never work on this equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

When the technician is aided by operators, he must warn

WARNING

Be careful not to contact high-voltage connections of 208 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated.

If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area.

An exhaust system equivalent to that of a paint spray booth should be used.

Air supplied respirators, approved by the National Institute for Occupational Safety and Health or the U.S. Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate.

Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this type of environment.

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing.

Wear thermal protective gloves and a face protector or safety glasses in any situation where skin- or eye-contact is possible.

Prevent contact of refrigerant gas with flame or hot metal.

**OPERATOR'S, ORGANIZATIONAL DIRECT SUPPORT,
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F18H-4A	208V, 3 Phase, 400 Hertz	4120-01-122-0627

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U. S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

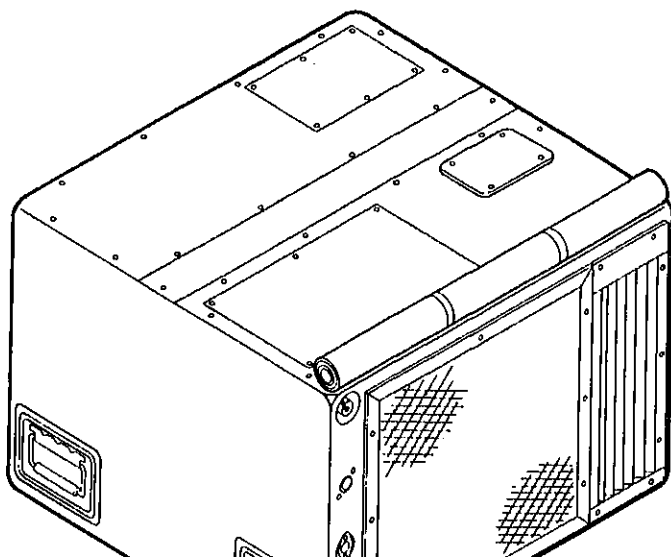
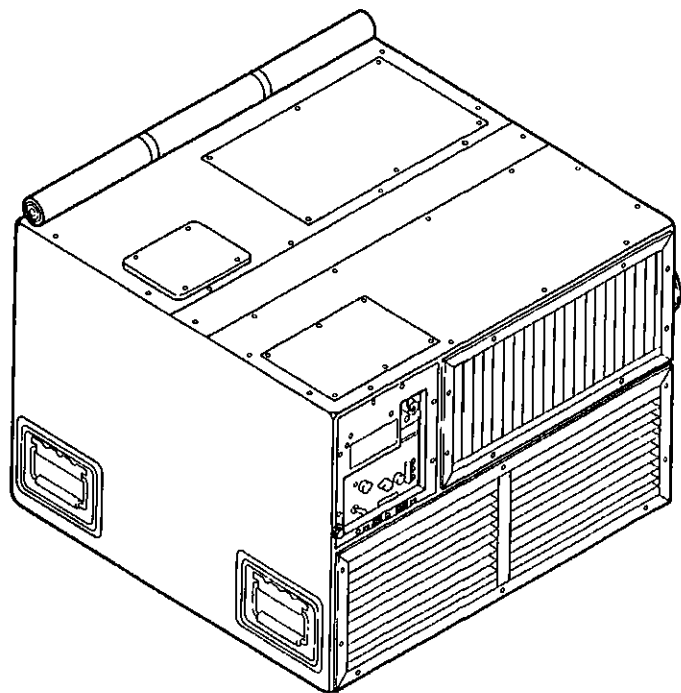
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Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual: Operator's, Organizational, Direct Support and General Support Maintenance Manual.

b. Model Numbers and Equipment Names: Keco Models F18H, F18H-3, and KIF-18H-4, 18H-3A and F18H-4A, 18,000 BTUH Cooling, Air Conditioners.

NOTE

Unless otherwise noted the F18H-3A and F18H-4A are identical to the F18H-3 and KIF-18H-4 respectively.

c. Purpose of Equipment. Cools and heats enclosed space (shelter). The units covered by this manual are designed for cooling and heating air to a desired predetermined range and circulating the conditioned air to provide heating and cooling of equipment or personnel within the air conditioned area.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

Maintenance forms and records used by the Marine Corps personnel are prescribed in TM 4700-15/1.

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

Command decisions, according to the tactical situation, will determine when destruction of the Air

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

Administrative storage of the Air Conditioner shall conform generally with the provisions of TM 740-90-Administrative Storage of Equipment.

1-5. HAND RECEIPT MANUAL

Hand receipts for the End Item/Components of End Item (COEI), Basic Issue Items (BII), and Addition Authorization List (AAL) items are published in a Hand Receipt Manual. The Hand Receipt Manual numeric designation is the same as the related Technical Manual with the letters HR added to the number. These manuals are published to aid in property accountability and are available through: Commander, US Army Adjutant General Publication Center, ATTN: AGDL-OD; 280 Eastern Blvd., Baltimore, MD 21220.

Not applicable to the Marine Corps. Refer to SL-1-3.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS)

If your Air Conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why the procedure is hard to perform. Put it on a SF 368 (Quality Deficiency Report). Mail it to us at Commander, Headquarters, US Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We'll send you a reply.

Marine Corps - by NAVMC form 10772 directly to the Commandant of the Marine Corps, ATTN: LMA-Washington, DC 20380.

b. Capabilities and Features of Model F18H

Cooling Capacity on COOL, BTU/Hour	18,000
Heating Capacity on HIGH HEAT, BTU/Hour	14,300
Heating Capacity on LOW HEAT, BTU/Hour	7,500
Power Requirements:	
Voltage	230
Phases	Single
Frequency, Hertz	50/60
Amperes, phase (maximum)	
Cooling	23
Heating	40
Watts, running (maximum)	
Cooling	5200
Heating	4400
Refrigerant type	R-22
Amount of charge, pounds	5.5 lbs (2.5 kg)

c. Capabilities and Features of Model F18H-3:

Cooling Capacity on COOL, BTU/Hour	18,000
Heating Capacity on HIGH HEAT, BTU/Hour	14,300
Heating Capacity on LOW HEAT, BTU/Hour	7,500
Power Requirements:	
Voltage	208
Phases	3
Frequency, Hertz	50/60
Amperes, each phase (maximum)	
Cooling	16
Heating	15
Watts, running (maximum)	
Cooling	5000
Heating	4400
Refrigerant type	R-22
Amount of charge, pounds	5.5 lbs (2.5 kg)

Power Requirements:

Voltage	208
Phases	3
Frequency, Hertz	400
Amperes, each phase (maximum)	
Cooling	26.4
Heating	15
Watts, running (maximum)	
Cooling	6500
Heating	5200
Refrigerant type	R-22
Amount of charge, pounds	5.5 lbs (2.5 kg)

e. Operating Temperatures. The air conditioners are capable of functioning as follows:

(1) Start, operate, and cycle on cooling mode up to plus 120° F (49° C) ambient temperature with air up to plus 120° F (49° C) entering the evaporator and condenser.

(2) Operate on cooling mode without forming frost or ice on the evaporator at 55° F (12° C) ambient temperature with air at plus 67° F (19° C) dry bulb and plus 57° F (14° C) wet bulb entering the evaporator.

(3) Operate on the heating mode in ambient temperatures as low as minus 50° F (10° C) and as high as plus 80° F (26° C).

(4) Start and operate on cooling mode at 0° F (-18° C) ambient temperature with air at plus 70° F (21° C) entering the evaporator.

f. Evaporator Airflow. With MODE SELECTOR set at VENT and the FAN SPEED set at HIGH, the evaporator airflow will be as follows:

Model	SCFM	m ³ /m
F18H	590	16.5
F18H-3	590	16.5
F18H-4	640	17.9

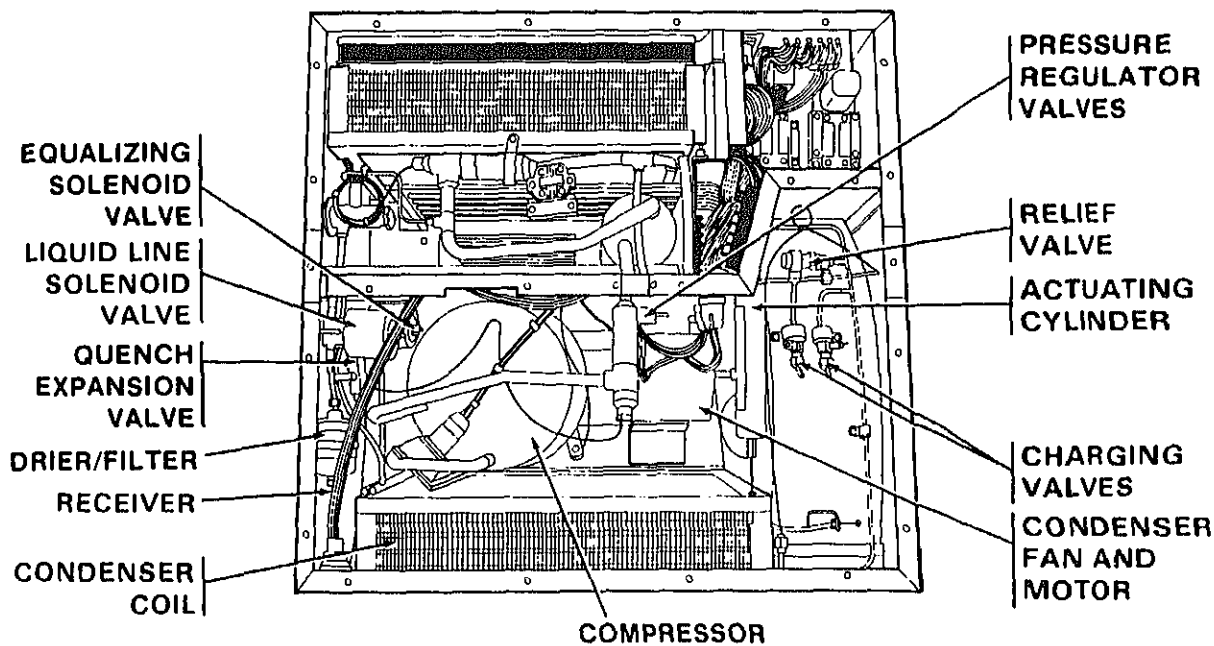


Figure 1-2. Air Conditioner, Condenser Section (Sheet 1 of 2)

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

a. Condenser Section (See figure 1-2)

Equalizing Solenoid Valve: This solenoid valve causes discharge and suction pressures to equalize whenever compressor is not operating.

Liquid Line Solenoid Valve: This solenoid valve controls flow of liquid refrigerant to the evaporator coil.

Quench Expansion Valve: This valve controls expansion of liquid refrigerant to gas in the suction line when the suction line super heat rises above 31 to 33° F (1 to +1° C).

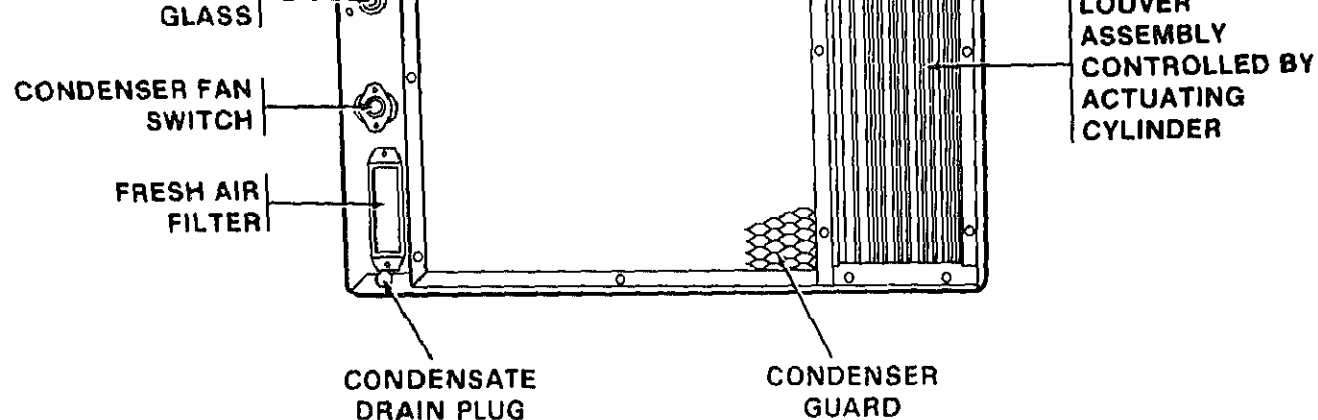
Drier/Filter (Dehydrator): A Drier/Filter (dehydrator) is a device used to remove water or water vapor

steel container with a lifetime charge of oil. A crankcase heater surrounds the lower part of the container. The heater is thermostatically controlled to prevent migration of liquid refrigerant into the crankcase where it would become mixed with the oil.

Pressure Regulator Valves: The pressure regulator valves are part of the hot gas by-pass circuit and open when the compressor suction pressure drops below preset level of 68 psig (4.78 kg/cm²).

Relief Valve: The relief valve opens when the discharge line pressure rises above 540 psig (37.97 kg/cm²).

Actuating Cylinder: This hydraulic cylinder operates the discharge louver assembly. It will start to open the louver assembly at 150 to 180 psig (10.55 to 12.66 kg/cm²) and fully open louver assembly at 220 to 260 psig (15.74 to 18.28 kg/cm²) compressor discharge pressure to allow



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Figure 1-2. Air Conditioner, Condenser Section (Sheet 2 of 2)

Input Power Receptacle (Alternate location): Connection for power supply.

Sight Glass, Liquid Indicator: The condition of liquid refrigerant flowing through the system can be observed through this window when the compressor is operating in the cooling mode. A milky or bubbly appearance of the refrigerant indicates that the system contains insufficient refrigerant, and that more must be added. The center of the sight glass has an area which indicates moisture content of the refrigerant. This area will change colors; green, chartreuse, and yellow.

COLOR	MOISTURE CONTENT
Green	None
Chartreuse	Slight
Yellow	Replace Drier/Filter and Refrigerant

Condensate Drain Plug: Drain connection for water collected below evaporator coil.

Condenser Fan Switch: Controls fan speed. At temperatures above 100° F (38° C) closes to allow high speed; below 100° F (38° C) opens to allow only low speed operation.

Fresh Air Filter: This filter cleans outside air drawn into the shelter.

NOTE:

The air conditioner can be equipped for operation in chemical-biological-radiological (CBR) environment by connecting filtering equipment to the fresh air filter.

Louver Assembly: Automatically controlled actuating cylinder.

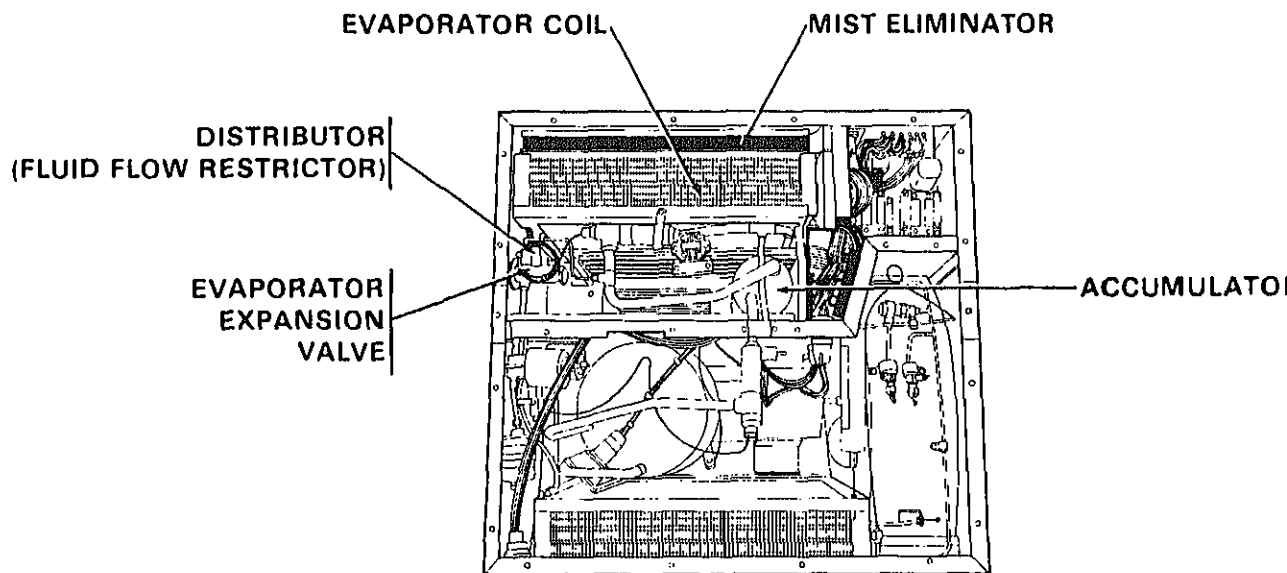


Figure 1-3. Air Conditioner, Evaporator Section (Sheet 1 of 2)

b. Evaporator Section (See figure 1-3).

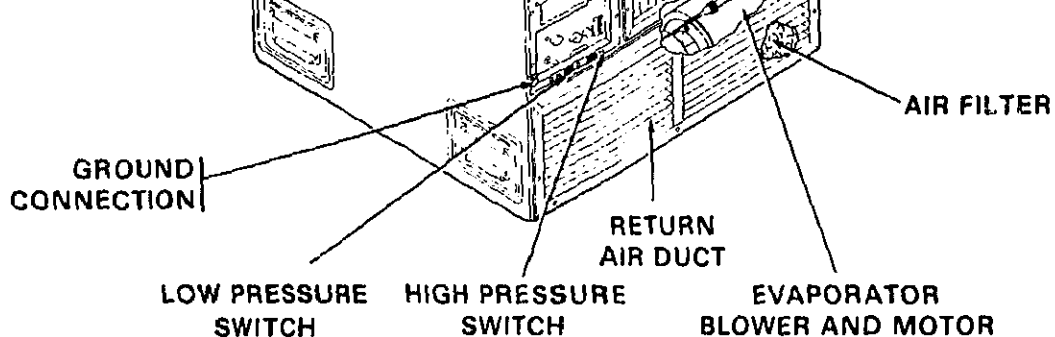
Evaporator Expansion Valve: This valve controls the amount of liquid refrigerant to the evaporator.

Distributor: This distributor divides expanding refrigerant to three circuits of the evaporator coil.

Evaporator Coil: The evaporator coil converts the liquid refrigerant into gas to cool the air.

Mist Eliminator: The purpose of the mist eliminator is to trap droplets of condensed water which has formed on the evaporator coil, so that they will not be blown into the air conditioned space.

Accumulator: The accumulator is a tank that holds liquid refrigerant which might be mixed with the gas leaving the evaporator coil preventing liquid refrigerant from entering the compressor.



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Figure 1-3. Air Conditioner, Evaporator Section (Sheet 2 of 2)

Input Power Receptacle (Alternate Location): Connection for power supply.

Ground Connection: The ground connection is an external point where shelter or van electrical ground is connected to the air conditioner.

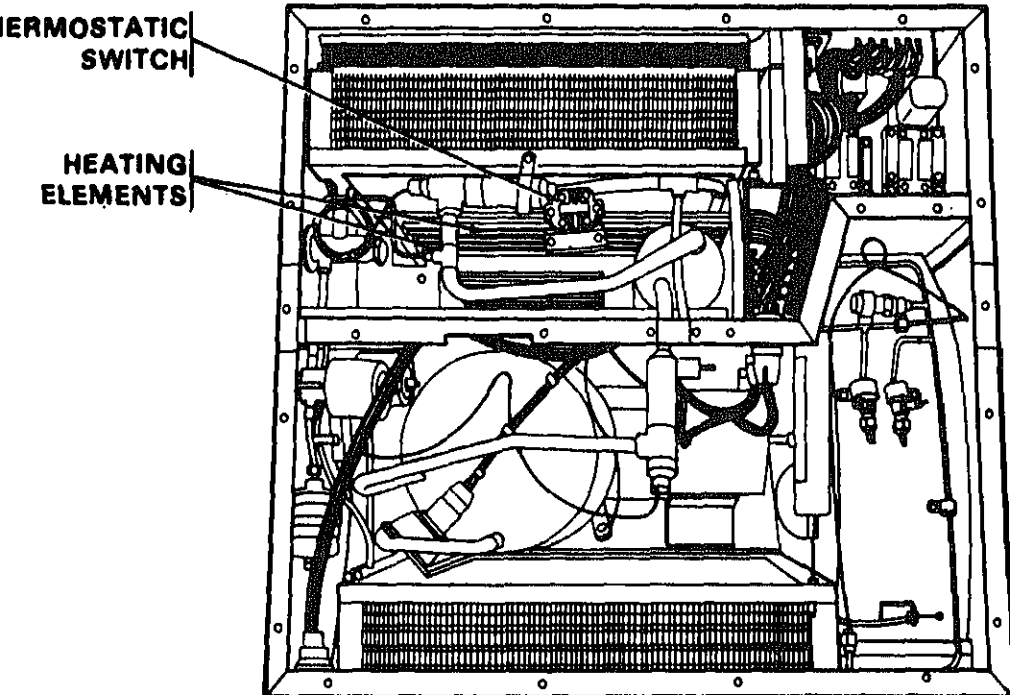
Low Pressure Switch: This switch opens when suction line pressure drops to 10 to 20 psig (.703 to 1.406 kg/cm²); this switch must be hand reset after the line pressure rises above 40 psig (2.812 kg/cm²).

High Pressure Switch: The high pressure switch opens when the discharge line pressure rises to 435 to 455 psig

(30.58 to 31.99 kg/cm²) to stop the compressor; this switch must be hand reset after the line pressure drops to 320 psig (22.50 kg/cm²).

Evaporator Blower and Motor: The evaporator blower and motor blows the shelter air over the evaporator coil to give up heat to the refrigerant (cool mode) or draws in the fresh or shelter air for ventilation.

Air Filter: The air filter removes dirt and dust from the air that is to be conditioned (not illustrated, located behind air intake grill).



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Figure 1-4. Air Conditioner, Top View, Top Covers Removed, Heating Section.

c. Heating Section (See figure 1-4).

Heating Elements: The heating elements heat the air before it passes through the evaporator coil.

Thermostatic Switch (Overheat Safety): The thermostatic switch opens the heating circuit at 145° F to 150° F (63° C to 66° C) and closes at 100° F to 120° F (38° C to 49° C).

*Amperes	23	16	26.4
Cooling	20	12	15
Heating			
*Watts			
Cooling	5200	5000	6500
Heating	4400	4400	5200

*Conditions: 120°F (49°C) ambient with 90°F (32.2°C) dry bulb 75°F (23.9°C) wet bulb air to evaporator.

NOTE

The compressor, condenser fan motor and the evaporator blower motor are different. They are not interchangeable because they have different windings for the different required power supplies.

NOTE

The information contained in this manual is applicable to all models except for differences noted. Differences in procedure will be detailed at point where they occur.

1-10. EQUIPMENT DATA

a. Types of Conditioning Available

High Vent Mode...Maximum air ventilation and filtering
 Low Vent Mode...Low velocity air ventilation and filtering
 High Cool Mode...Maximum cooling, filtering, and dehumidification
 Low Cool Mode...Low velocity cooling, filtering and dehumidification
 High Heat Mode...High velocity heating
 Low Heat Mode...Low velocity heating

f. Refrigerant (R22)...5.5 pounds (2.5 kg)

g. Physical Characteristics

Dimensions...

30 inches (76.2 cm) wide
 28 inches (71.12 cm) deep
 20 inches (50.8 cm) high

Weight...F18H—278 pounds (126.1 kg)

F18H-3—270 pounds (122.5 kg)

KIF-18H-4—265 pounds (120.2 kg)

h. Evaporator and Condenser Fan Motor Rating

	F18H	F18H-3	KIF-18H-4
Voltage	230	208	208
Hertz	50/60	50/60	400
Phase	1	3	3
RPM			
High	3450	3450	3750
Low	1725	1725	1800
Amperes			
High	3.5	2.3	6.0
Low	1.2	0.9	3.0
HP			
High	.73	.73	1.1
Low	.12	.12	.27
Duty	Continuous	Continuous	Continuous
Thermal Protector	248°F (120°C)	248°F (120°C)	302°F (150°C)
Rotation (Facing Shaft End)	Counter-Clockwise	Counter-Clockwise	Counter-Clockwise

i. Compressor Motor Rating

	F18H	F18H-3	KIF-18H-4
Voltage	230	208	208
Hertz	50/60	50/60	400
Phase	Single	3	3
Thermal Protector	Internal	Internal	Internal

j. Switch Setting...

Low Pressure Cutout...Open at 10 to 20 psig (.703 to 1.406 kg/cm²). Hand reset when pressure rises to 40 psig (2.812 kg/cm²).

High Pressure Cutout...Open at 435 to 455 psig (30.58 to 31.99 kg/cm²). Hand reset when pressure decreases to 320 psig (22.50 kg/cm²).

refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the metal tubing to the split condenser coil (3) and receiver (4).

- The condenser fan draws outside ambient air over and through the two section condenser coil (3). The high temperature, high pressure gas from the compressor (1) is cooled by the flow of air and is changed into a high pressure liquid.

- The liquid sight glass (5) indicates the presence of moisture and quantity of refrigerant in the system.

- The drier/filter dehydrator (6) removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant.

- The solenoid valve (7) is controlled by the temperature selector on the control panel. This valve will shut off the flow of refrigerant to the evaporator section when the temperature in the conditioned area reaches the set point.

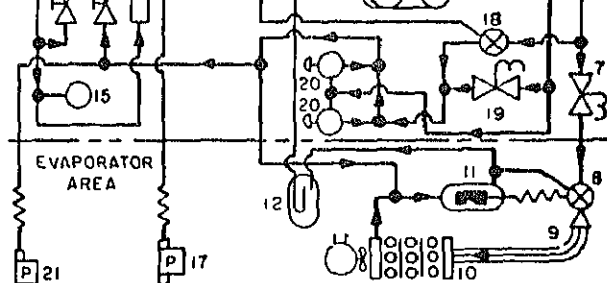
- The expansion valve (8) controls the amount and pressure of liquid refrigerant to the evaporator coil (10). The expansion valve (8) senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of the feeler bulb in the bulb well (11) and "external equalizer line" the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil (10).

- As the high pressure liquid refrigerant leaves the expansion valve (8) it enters the evaporator coil (10). As the liquid enters the coil, due to the size difference between the coil and the tubing, the pressure is suddenly decreased. As the pressure decreases the liquid refrigerant "flashes" to a gas. The evaporator blower circulates the warm air from the conditioned space over and through the evaporator coil. Liquid absorbs heat when it changes from a liquid to a gas. As the air from the conditioned space comes in contact with evaporator coil (10), the air is cooled.

- The accumulator (12) holds any liquid refrigerant which did not change to a gas in the evaporator. Heat in the evaporator section will boil this liquid to a gas before entering the compressor.

- To prevent compressor damage during start-up, solenoid valve (19) is normally open to equalize pressure on both sides of the compressor.

b. Bypass System. This unit has a bypass system which allows cooling operation at low cooling loads without cycling the compressor on and off. In bypass the refrigerant is piped from the discharge to the suction side of the compressor, bypassing the evaporator coil (10).



FIND NO	NOMENCLATURE
1A	COMPRESSOR
1B	SUCTION LINE FILTER
3A	COIL, CONDENSER WITH ANGLE
3B	SUBCOOLER
4	RECEIVER, LIQUID REFRIGERANT
5	INDICATOR, SIGHT, LIQUID
6	DEHYDRATOR, DESICCANT, REFRIGERANT
7	SOLENOID VALVE, WITH LEADS
8	VALVE, EXPANSION (PRIMARY)
9	RESTRICTOR, FLUID FLOW
10	COIL, EVAPORATOR WITH ANGLE
11	BULB WELL
12	ACCUMULATOR
14	VALVE, CHARGING, WITH CAP
15	VALVE, PRESSURE RELIEF
16	CYLINDER ASSY, ACTUATING, LINEAR
17	SWITCH, PRESSURE (HIGH)
18	VALVE, EXPANSION (QUENCH)
19	SOLENOID VALVE WITH LEADS
20	REGULATOR, FLUID PRESSURE
21	SWITCH, PRESSURE (LOW)

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Figure 1-5. Refrigerant Flow Diagram

- When the temperature selector on the control panel senses that cooling conditions have reached the set point, it closes the solenoid valve (7) to shut off refrigerant flow to the evaporator coil (10).

- As the compressor suction pressure starts to drop, the pressure regulators (20) open to allow flow of hot gas from the compressor.

- The quench valve (18) senses the temperature of the gas at the suction side of the compressor. To prevent excessively hot gas from reaching the compressor the quench valve (18) opens to allow liquid refrigerant to mix with the hot gas.

LOW operation during heating.

HPCO	High Pressure Cut-Out
kg	Kilogram
lbs	Pounds
LPCO	Low Pressure Cut-Out
psi	Pounds Square Inch
psig	Pounds Square Inch Gauge
RPM	Revolutions Per Minute
rqr	Required
VDC	Volts Direct Current

are fully open.

I. CONTROLS AND INDICATORS

CAUTION

to start unit on "cool" mode at 0°F ambient jumper PCO switch (S-5).

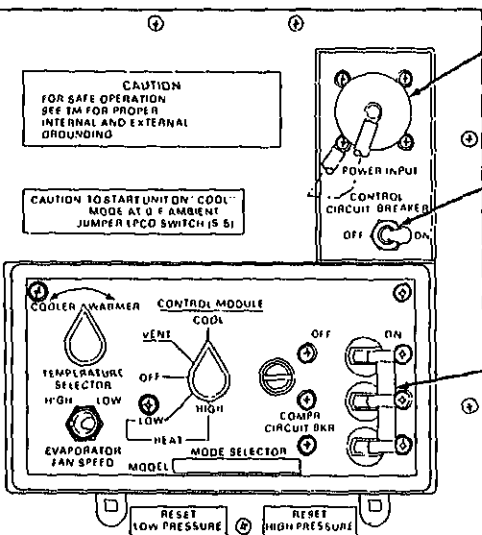
Power input connector, alternate location

Control Circuit Breaker

- Move switch to ON position to reset
- Move switch to OFF for power off

Compressor Circuit Breaker

- Move switch to ON position to reset
- Move switch to OFF position for power off



- Clockwise for warmer Approx. 90°F (32.2°C)
- Counterclockwise for cooler Approx. 60°F (15.5°C)

Evaporator Fan Speed

- Turn switch to low for low speed
- Turn switch to high for high speed

External Ground Connection

- Connect to shelter or van internal ground

Low Pressure Cutout Switch

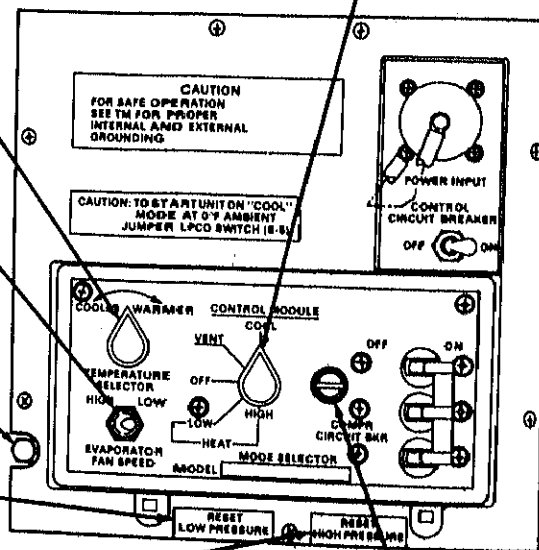
- Push to reset

High Pressure Cutout Switch

- Push to reset

NOTE

The control range of the TEMPERATURE SELECTOR switch is 60 to 90°F (15.5 to 32.2°C).

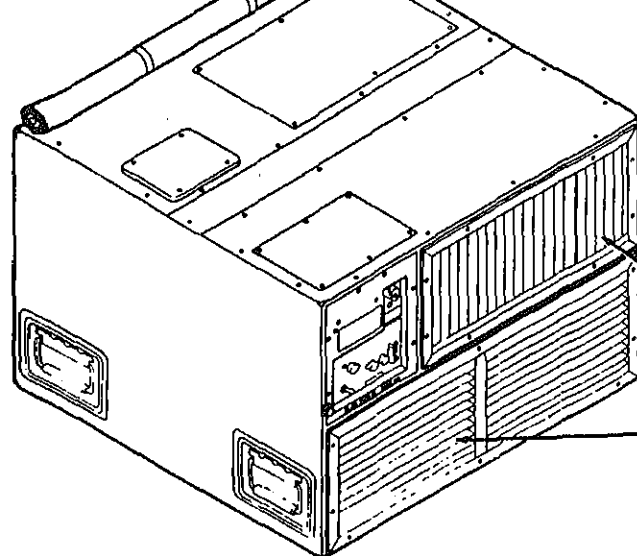


Control Module Connector Knob *

- (Maintenance Only) DO NOT TURN

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* The connector knob was supplied on units prior to 1983. This knob is not supplied on F18H-3A or F18H-4A units and is not required on existing F18H, F18H-3 or F18H-4 units. Use screw driver slot in end of shaft.



Fresh Air Inlet Vent Control

- Rotate downward to open vent
- Rotate Upward to close vent

Air Outlet Louvers

- Individually moveable

Inlet Louver Tabs

- Move TABS upward to open louvers
- Move TABS downward to close louvers

NOTE

Cool air is denser than warm air, so it tends to sink downward; therefore, it is usually desirable to direct cool air slightly upward and warm air slightly downward for maximum comfort and coverage.

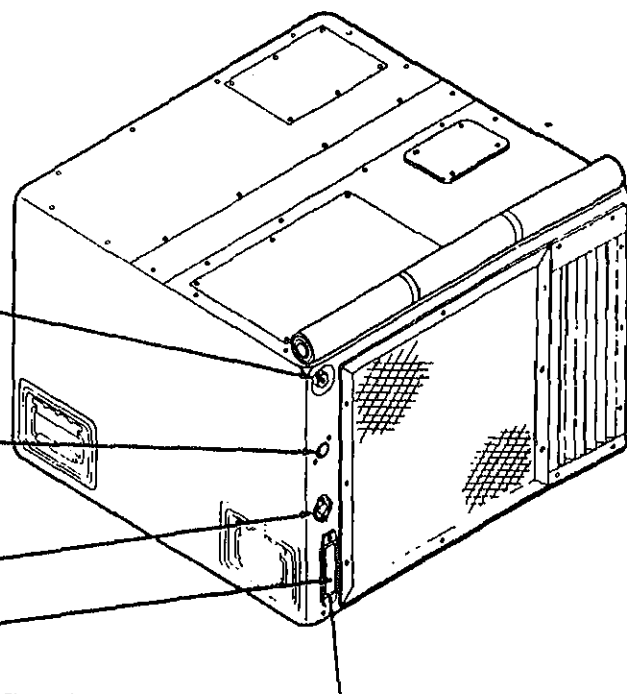
Power Input Connector, Main Location

Liquid Sight Indicator

- Milky or cloudy fluid or bubbles indicate insufficient charge or contaminated refrigerant system

Condenser Fan Switch

Fresh Air Inlet



Condensate Drain

NOTE

The air conditioner can be equipped for operation in chemical-biological-radiological (CBR) environment by connecting filtering equipment to the rectangular covered opening at the lower left side of the rear surface of the unit.

HIGH HEAT, and VENT modes. Refer any malfunction to organizational maintenance.

have not operated the item since the last weekly PMCS.

- (2) You are operating the item for the first time.

Table 2-1. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

NOTE

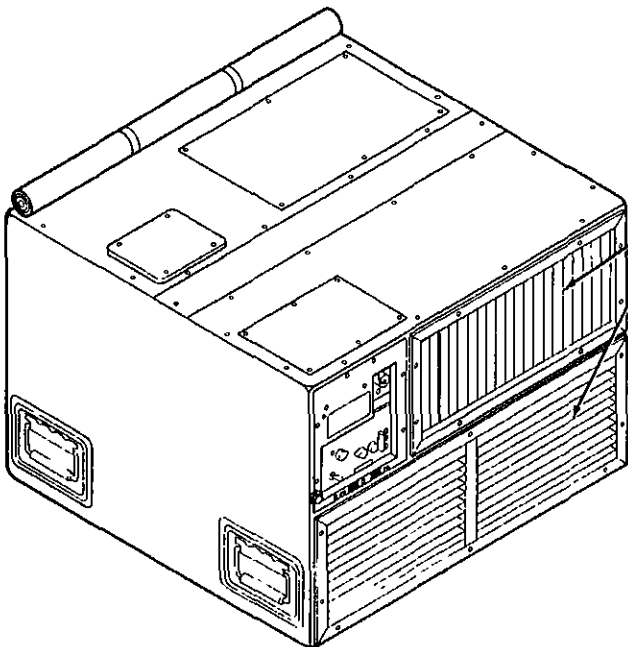
Within designated interval, these checks are to be performed in the order listed.

B-Before

D-During

Item No.	Interval	Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment Not Ready/ Available
	D			
1	●	Air Conditioner Unit	During starting and operation, check for unusual noise and rough running. Check for excessive vibration, lack of power, or any indication of a failing or defective component. If suspected, notify organizational maintenance.	

2-3. BEFORE OPERATION



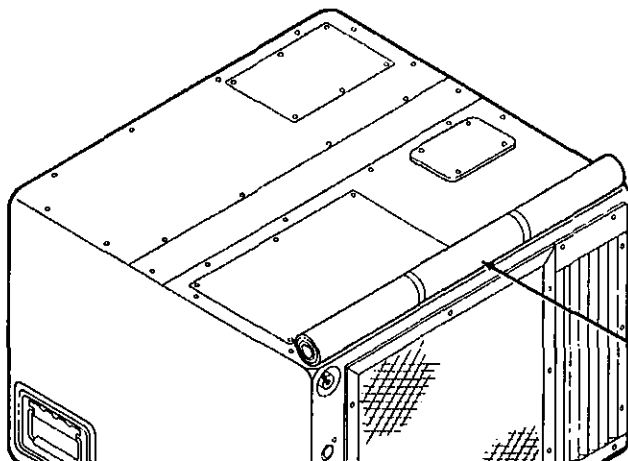
1. Check all air intake and discharge openings. They should be clear.

NOTE

When possible...the shelter circuit breaker (provides power to air conditioner) should be ON at least 6 hours before operating the unit in the cool mode. This allows the crankcase heater to raise the compressor oil temperature to normal operating range.

NOTE

Cool air is denser than warm air, so it tends to sink downward; therefore, it is usually desirable to direct cool air slightly upward and warm air slightly downward for maximum comfort and coverage.



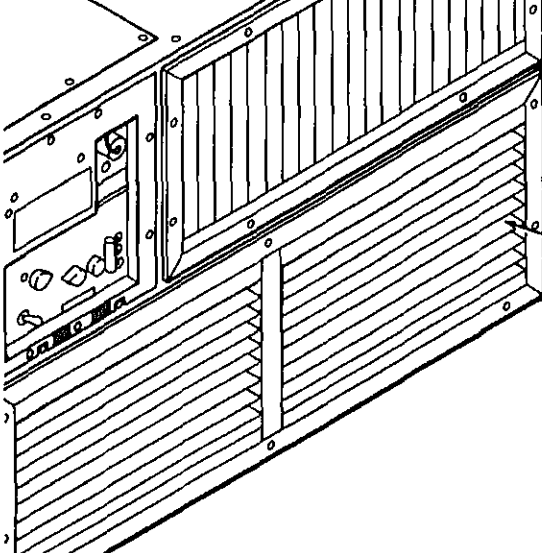
2. Condenser cover must be rolled up and tied on top of air conditioner.

NOTE

Under all but extreme weather conditions, it is desirable to introduce about 10 percent of fresh air into the system. This will create a slight positive pressure, and will help to eliminate the musty odors associated with stale air.

Mode	Mode Selector	Temperature Selector	Fresh Air Damper	Evaporator Intake Grille	*Fan
Cooling-100% Recirculated Air	COOL	Desired Temperature	Closed	Open	Ro
Cooling-with fresh makeup air	COOL	Desired Temperature	Partially or fully open	Partially or fully closed*	Ro
Cooling-with fresh makeup air through CBR filter	COOL	Desired Temperature	Fully Open	Partially or fully open*	Ro
Heating-100% Recirculated Air	LO HEAT or HI HEAT	Desired Temperature	Closed	Open	Op
Heating-with fresh makeup air	LO HEAT or HI HEAT	Desired Temperature	Partially or fully open	Partially or fully closed*	Ro
Heating-with fresh makeup air through CBR filter	LO HEAT or HI HEAT	Desired Temperature	Fully Open	Partially or fully open*	Ro
Ventilation-Maximum outdoor air	VENTILATE	Any Setting	Open	Closed	Ro

* Partial closing of the evaporator intake grille causes a greater portion of the total airflow to be drawn from



2. Fresh Air Inlet Vent Control
Turn up to close vent. Turn down to open vent

3. Inlet Louver
Move up to open. Move down to close

4. Control Circuit Breaker ON

11. Stop cooling. Turn mode selector to OFF

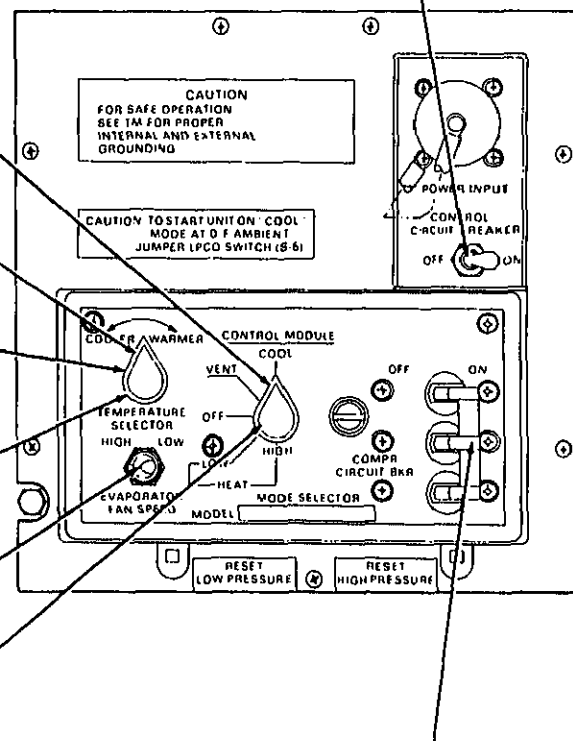
10. Adjust shelter temperature by turning temperature control knob in either direction.

9. When shelter temperature drops to the desired level, turn temperature control slowly toward warmer. Cooling will stop when temperature control senses cooling is no longer required.

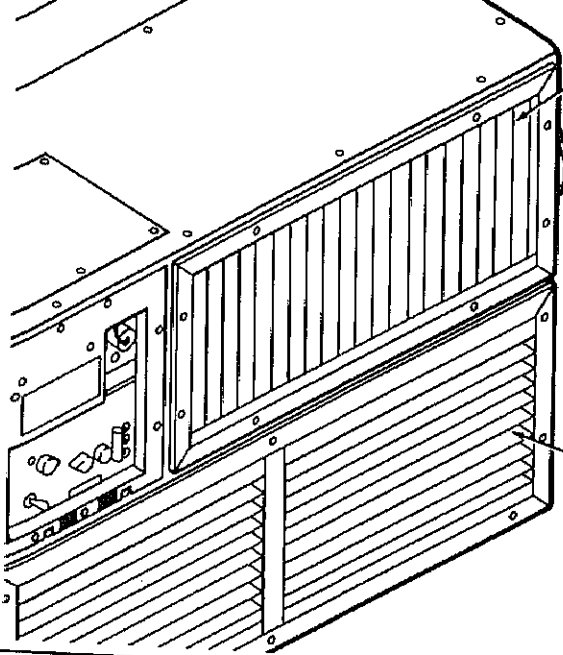
8. Temperature Adjustment. Turn temperature selector to cooler. Within 2 minutes, discharge air will feel cooler than ambient air.

7. Fan Speed. Move evaporator fan speed to high or low as desired. After 5 seconds air flow can be felt.

6. Mode Selector. Turn Mode Selector Switch To Cool



5. Compressor Main Circuit Breaker ON



1. Air Outlet Louvers
Individually Adjustable

2. Fresh Air Inlet Vent Control
Turn up to close vent. Turn down to open vent

NOTE

In low heat, air is circulated only in the evaporator section. The condenser blower will not operate.

3. Inlet Louver
Move up to open. Move down to close

4. Control Circuit Breaker ON.

CAUTION

Move to vent to remove heat from electric heaters. Heaters could be damaged by heat buildup.

11. To Stop Heating. Move mode selector to vent for 5 minutes. After 5 minute vent operation, move switch to off.

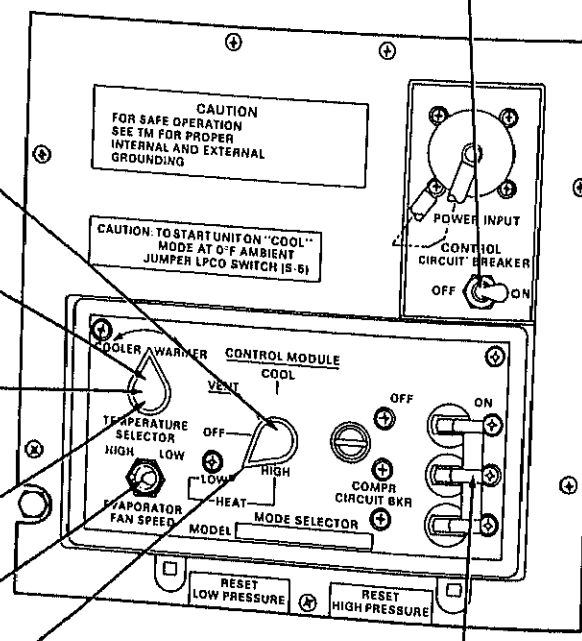
10. Adjust shelter temperature by turning temperature control knob in either direction.

9. When shelter temperature rises to the desired level, turn temperature control slowly toward cooler. Heating will stop when temperature control senses heating is no longer required.

8. Temperature Adjustment. Turn temperature control to warmer. After 2 minutes, discharge air will feel warmer than ambient air.

7. Fan Speed. Move evaporator fan speed switch to high or low.

6. Mode Selector. Turn selector switch to low heat. After 5 seconds, air flow can be felt.



2-6. HIGH HEAT OPERATION

1. Air Outlet Louvers

Individually Adjustable

2. Fresh Air Inlet Vent Control

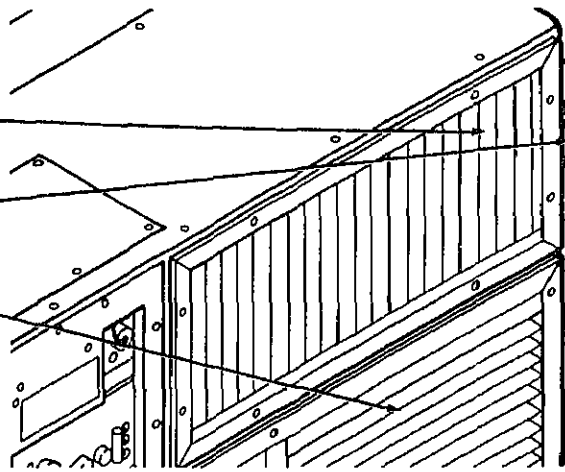
Turn up to close vent. Turn down to open vent

3. Inlet Louver

Move up to open. Move down to close

Note

The temperature control operates one bank of heating elements. In **high heat**, a second bank of elements is continuously on.



Note

In **high heat**, air is circulated only in the evaporator section. The condenser blower will not operate.

4. Control Circuit Breaker ON.

5. Compressor Main Circuit Breaker ON.

6. Mode Selector. Turn selector switch to high heat.

After 5 seconds, air flow can be felt.

7. Turn temperature control to warmer. After 2 minutes,

discharge air will feel warmer than ambient air.

8. When shelter temperature rises to the desired level,

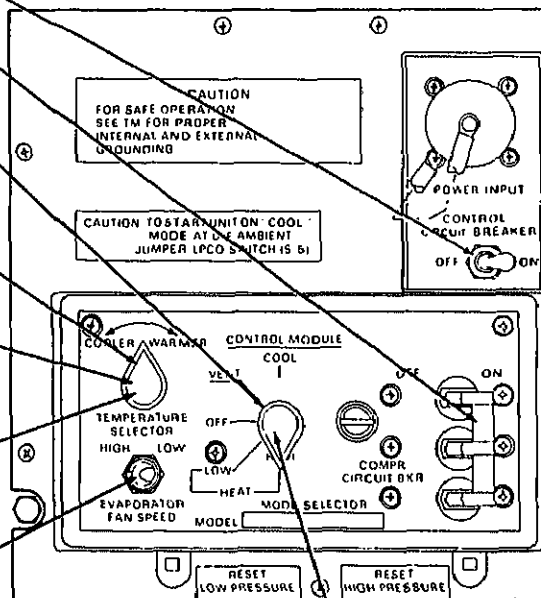
turn temperature control slowly toward **cooler**. Heating will stop when temperature control senses heating is no longer required.

9. Adjust shelter temperature by turning temperature

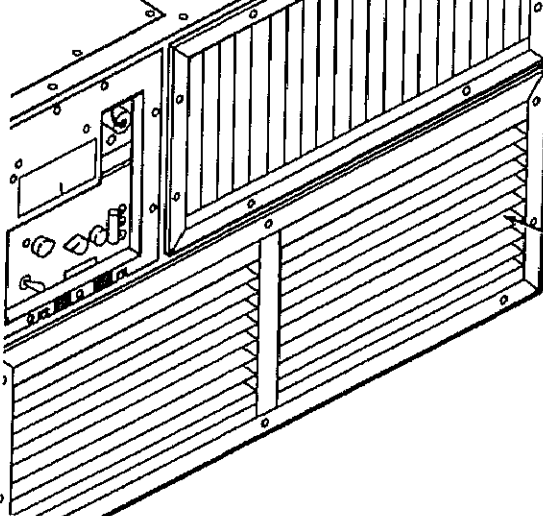
control knob in either direction.

10. Fan Speed. Move evaporator fan speed switch to

high or low.



Note



2. Fresh Air Inlet Vent Control
Turn up to close vent. Turn down to open vent

3. Inlet Louver
Move up to open. Move down to close

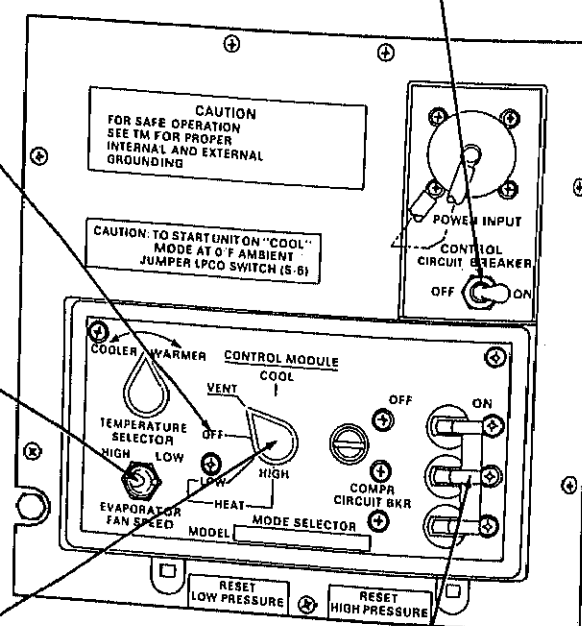
4. Control Circuit Breaker ON.

8. Stop Vent. Turn mode selector to off.

7. Fan Speed. Move evaporator fan speed to high or low as desired. After 5 seconds air flow can be felt.

6. Mode Selector. Turn mode selector switch to vent.

5. Compressor Main Circuit Breaker ON.



2-8. OPERATION IN EXTREME COLD

This task covers:

- a. Operation in extreme cold.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON

Installed in shelter

Special Environmental Conditions

Below 0°F (-18°C)

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.

BEFORE OPERATION

- a. Before starting on cooling cycle, be sure cover is rolled from condenser air intake and discharge.
- b. Clear all ice and snow from openings.
- c. Be sure all dampers are in operating condition.
- d. To start unit on COOL mode at 0°F (-18°C) ambient (min. operating temp.) jumper LPCO switch. Refer to paragraph 3-7.

AFTER OPERATION

Install cover over condenser air intake and discharge openings.

CAUTION

Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.

9. OPERATION IN EXTREME HEAT

This task covers:

- Operation in extreme heat

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON

Installed in shelter

Special Environmental Conditions

Above 120°F (49°C)

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

GENERAL

- The air conditioner is designed to operate satisfactorily at temperatures up to plus 120°F (49°C).
- If unit is operated at condenser inlet temperatures higher than 120°F (49°C) the cooling capacity will be lowered and long periods of operation at extended temperatures may cause condenser or condenser fan motor to overheat and trip their internal overload switches or the high pressure cutout switch will shut the unit off.

FILTERS

- To maintain the highest capacity of the unit, the return air filter and fresh air screen should be cleaned weekly or more often if necessary.
- Dirty filters reduce the flow of air across the evaporator coil, thereby reducing the capacity of the air conditioner.

GUARDS AND

Keep all guards and louvers clean and free

2-10. OPERATION IN DUSTY OR SANDY AREAS

This task covers:

- a. Operation in dusty or sandy areas.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power ON
Installed in shelter

Special Environmental Conditions

Extreme dusty or sandy

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Operator

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

PROTECTION

- a. Shield the air conditioner from dust as much as possible.
- b. Take advantage of any natural barriers which offer protection.

CLEANING

- a. Keep the air conditioner as clean as possible.
- b. Pay particular attention to the louvers, filters, coils and electrical components.

CAUTION

Never operate the unit without having the air filters in place.

FILTERS AND COILS

- a. Under extremely dusty or sandy conditions, the louvers, filters, coils, and electrical components must be serviced more often.

All
<u>Test Equipment</u>
None
<u>Special Tools</u>
None
<u>Materials/Parts</u>
None
<u>Equipment Descriptions</u>
Power ON
Installed in shelter

<u>General Safety Instructions</u>
See WARNING page
<u>References</u>
None
<u>Troubleshooting References</u>
None
<u>Personnel Required</u>
Operator

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

COVER EQUIPMENT

WARNING

Make sure power is disconnected from air conditioner before touching any wiring or other electrical parts.

- Take special precautions to keep equipment dry. If installed outdoors, cover the equipment with a waterproof cover when it is not in use.
- Remove cover during the dry periods. Take all necessary precautions to keep electric components free from moisture.

KEEP DRY

2-12. OPERATION IN SALT WATER AREAS

This task covers:

- a. Operation in salt water areas.

INITIAL SETUP

Special Environmental Conditions

Applicable Configurations

Salt water spray

All

General Safety Instructions

Test Equipment

See WARNING page

None

References

Special Tools

None

None

Troubleshooting References

Materials/Parts

None

None

Personnel Required

Equipment Descriptions

Operator

Power ON
Installed in shelter

LOCATION/ITEM

ACTION

REMARKS

WASH

WARNING

Disconnect power source prior to washing the air conditioner.

- Wash the exterior and condenser section of the unit, particularly condenser air discharge louver control mechanism. Refer to paragraph 5-25.
- Be careful not to damage electrical system with water.
- Special attention must be given to prevent rust and corrosion.

CHAPTER 3

REPAIR PARTS, SERVICE, AND PREVENTIVE MAINTENANCE

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-1. COMMON TOOLS AND EQUIPMENT

a. For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

b. Tool Kit, Service, refrigeration Unit, NSN 80-00-596-1474, contains hand tools and equipment used for air conditioner maintenance. The following items not contained in the refrigeration unit tool kit are also required for air conditioner maintenance.

<u>Description</u>	<u>National Stock Number</u>
Brush, Bristle	7520-00-223-8000
Brush, Wire	7920-00-282-9246
Bucket	7240-00-137-1609
Heat Gun	4940-01-042-4855
Multimeter	6625-00-553-0142
Nitrogen Regulator	6685-00-449-7484
Snippers, Long Round Nose	5120-00-268-3579
Rubber Gloves	8415-00-266-8677

Description

National Stock Number

Safety Goggles	4240-00-052-3776
Screwdriver, Cross Tip No. 2 1/2 Inch Long Blade	5120-00-227-7293
Screwdriver, Offset, Cross Tip No. 1	5120-00-256-9014

3-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment is required.

3-3. REPAIR PARTS

Repair parts are listed and illustrated in Repair Parts and Special Tools List (RPSTL) TM5-4120-367-24P.

INITIAL SETUPApplicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Organizational Support Maintenance (2 rqr)

Equipment Description

Assembled, Ready for Installation

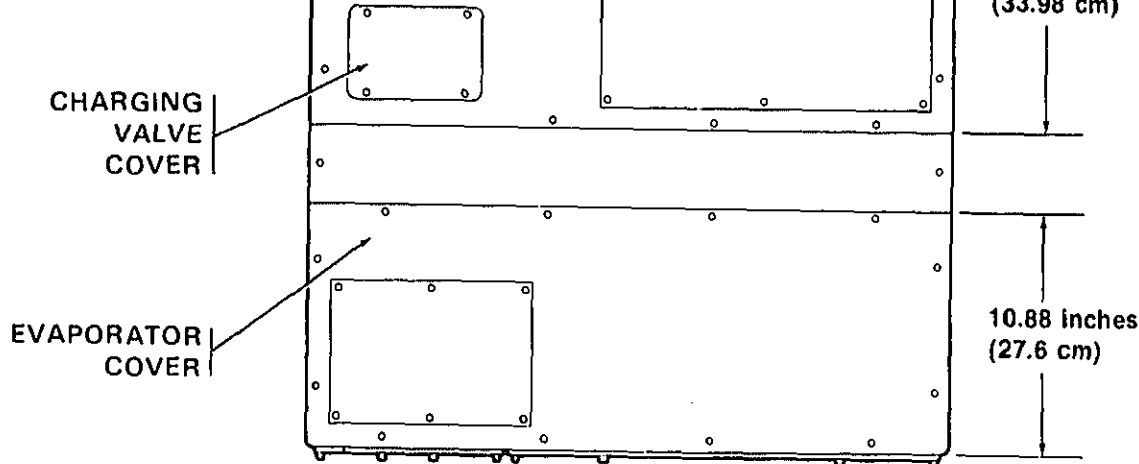
Special Environmental Conditions

None

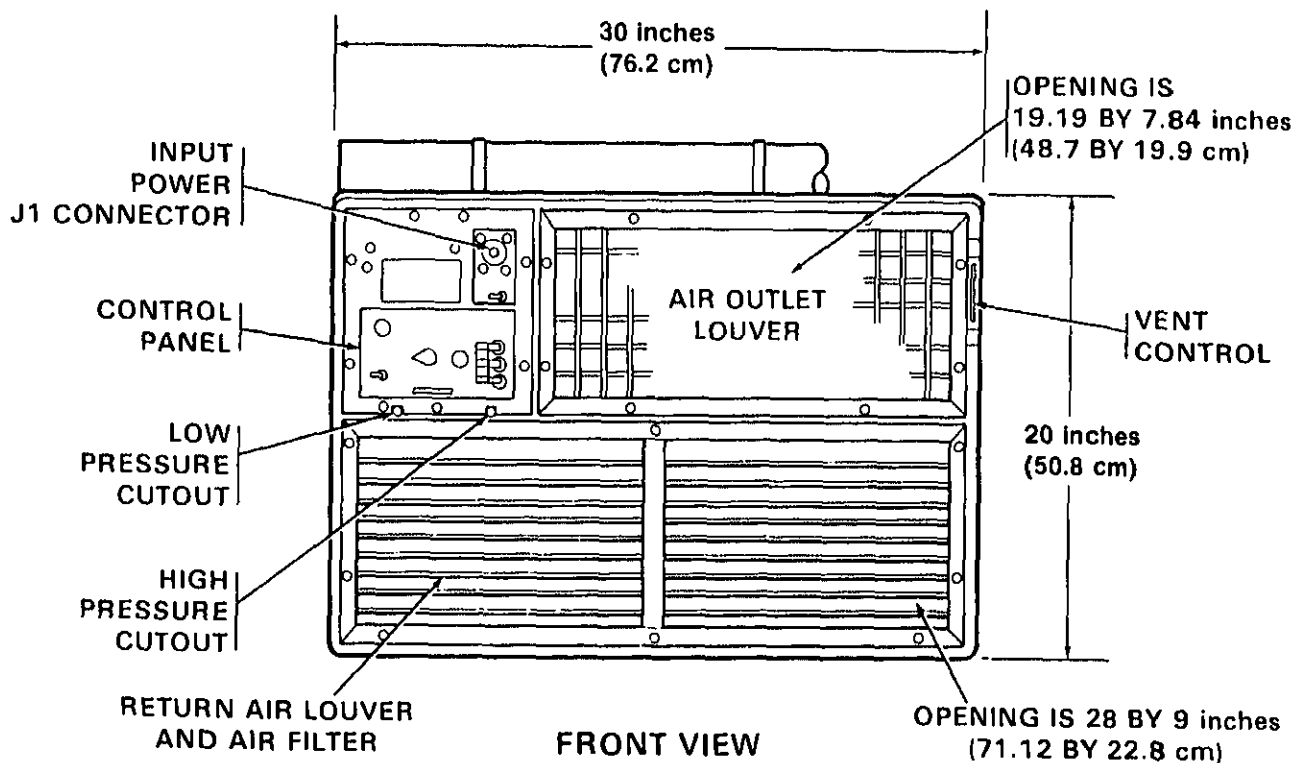
Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
I. Container	a. Cut steel strapping	
Air Conditioner	b. Remove plastic wrap	
	c. Lay unit on side with help of assistant	
	d. Remove four mounting bolts.	Keep bolts for permanent mounting.
	a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.	
INSPECTION	b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-750.	
	c. Check to see whether the equipment has been modified.	
	d. Report any modifications.	



TOP VIEW



FRONT VIEW

Figure 3-1. Installation Dimensions (Sheet 1 of 2)

INPUT POWER
CONNECTOR
J11

SIGHT GLASS

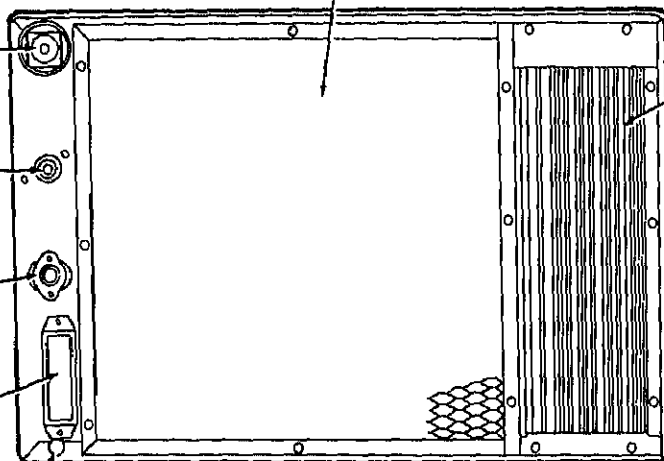
CONDENSER
FAN
SWITCH

FRESH AIR
INLET

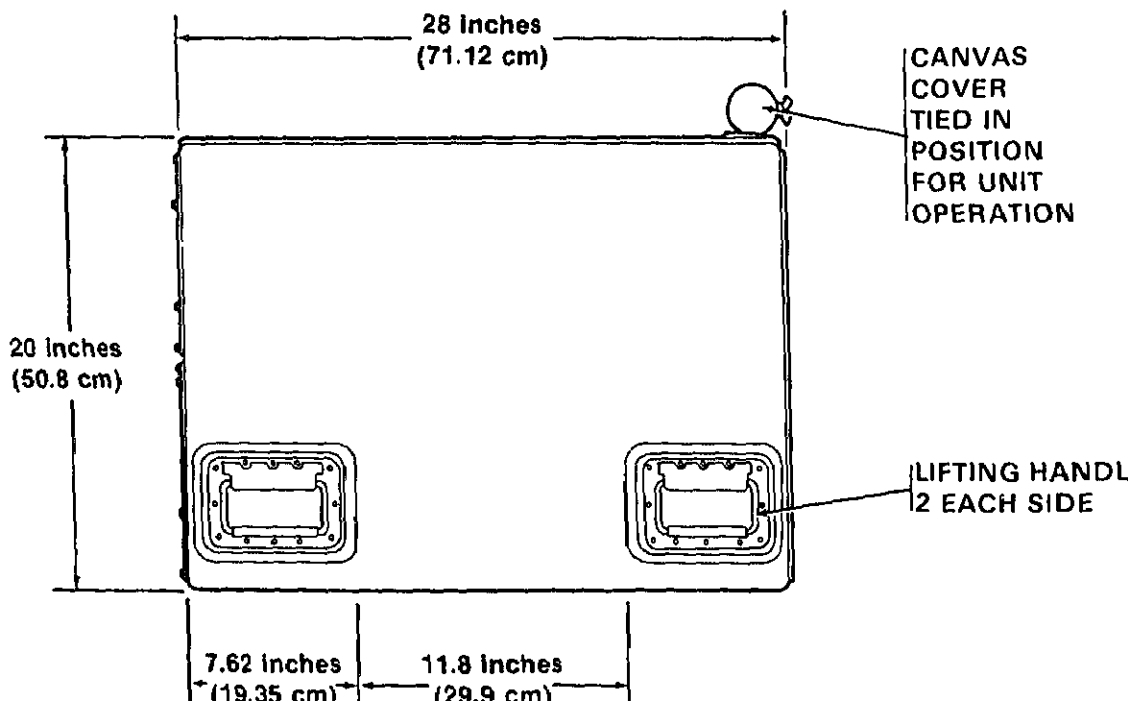
CONDENSATE
DRAIN PLUG
1/8-27 NPT

REAR VIEW

CONDENSER
AIR OUTLET
LOUVERS



RIGHT SIDE VIEW



INITIAL SETUPApplicable Configurations

All

Test Equipment

None

Special Tools

Hoist or Wrecker Sling

Materials/Parts

Foam Insulating material
Pressure sensitive tape
#10 AWG Ground Wire
Mounting Bracket
Shims material

Personnel Required

Organizational Support Maintenance
(2 rqr)

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

1. Shelter

Air conditioner

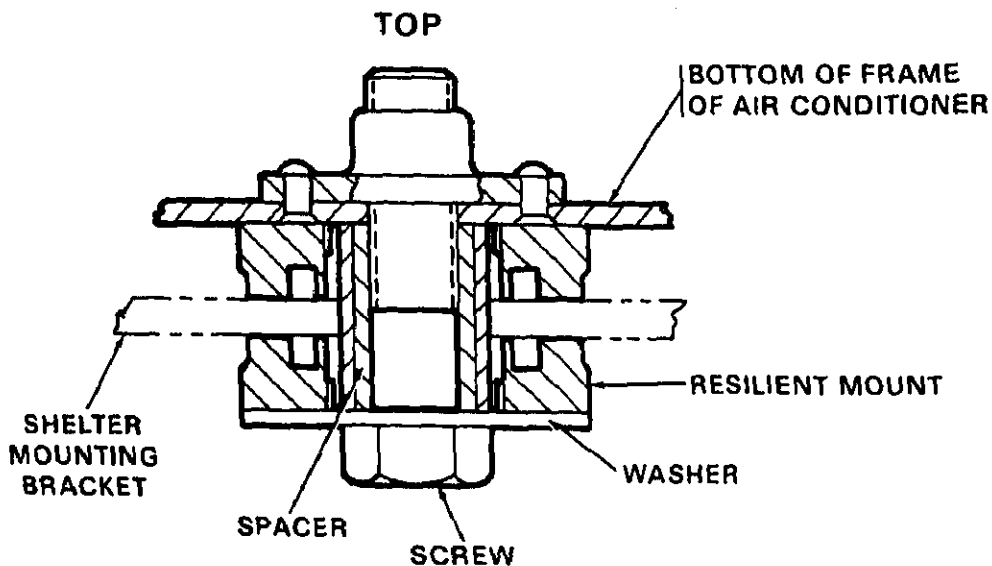
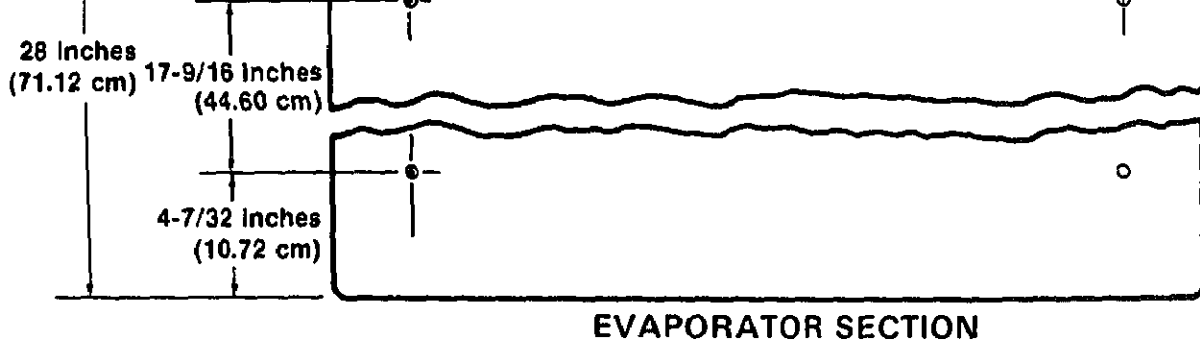
- Select a support which allows slight slope. No more than 5 degrees front to rear (Evaporator to condenser)
- See figure 3-1 for dimensions and location of mounting hardware.
- Leave approximately 24 inches (60.8 cm) for maintenance.
- Check that there will be an unobstructed flow of outside air to and from condenser coil.
- Check that no source of dangerous or objectionable fumes will be within 10 feet (30.4 m) of the fresh air intake.

Evaporator higher than condenser to allow flow of condensate water

Mounting hardware supplied with unit.

More space is desirable.

Keep all sources of heat at least 10 feet (30.4 m) from condenser coil



AC
TM5-4120-367

Figure 3-2. Mounting Hole Location

Table 3-1. AC POWER SUPPLY REQUIREMENTS

Model	Voltage	Phase	Hertz
8H	230	Single	50/60
8H-3	208	3	50/60
8H-4	208	3	400

Table 3-2. JI AND JII WIRING

Model	JII	Connector J1	Schematic *
8H	Fig 3-3	Fig 3-4	FO-1
8H-3	Fig 3-5	Fig 3-6	FO-2
8H-4	Fig 3-5	Fig 3-6	FO-3

*Foldout located at back of manual.

NOTE

Two input power connectors are provided on the air conditioner. Connector J1 is located on the evaporator section above the control module. Connector JII is located on the condenser section right above the sight glass. Wiring at terminal boards TB3 must be connected to the connector which is to be used for input power.

NOTE

It may be necessary to isolate neutral from ground in the air conditioner to prevent electrical interference. It will be necessary to remove the air conditioner from the installed position to remove the jumper. If possible determine the possibilities of electrical interference before installing the air conditioner.

Table 3-3. CONNECTOR PIN WIRING, MODEL F18H

Pin	Internal Wiring Connection J1 and J11
A	Positive
B	Neutral
C	Blank not used
D	Ground
E	Blank not used

Table 3-4. PHASE ROTATION MODELS F18H-3 AND F18H-4

Pin	Internal Wiring Connection J1 And J11
A	Phase A
B	Phase B
C	Phase C
D	Ground
E	Blank not used.

INSTALLATION OR REMOVAL CONTINUED

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

INSTALLATION

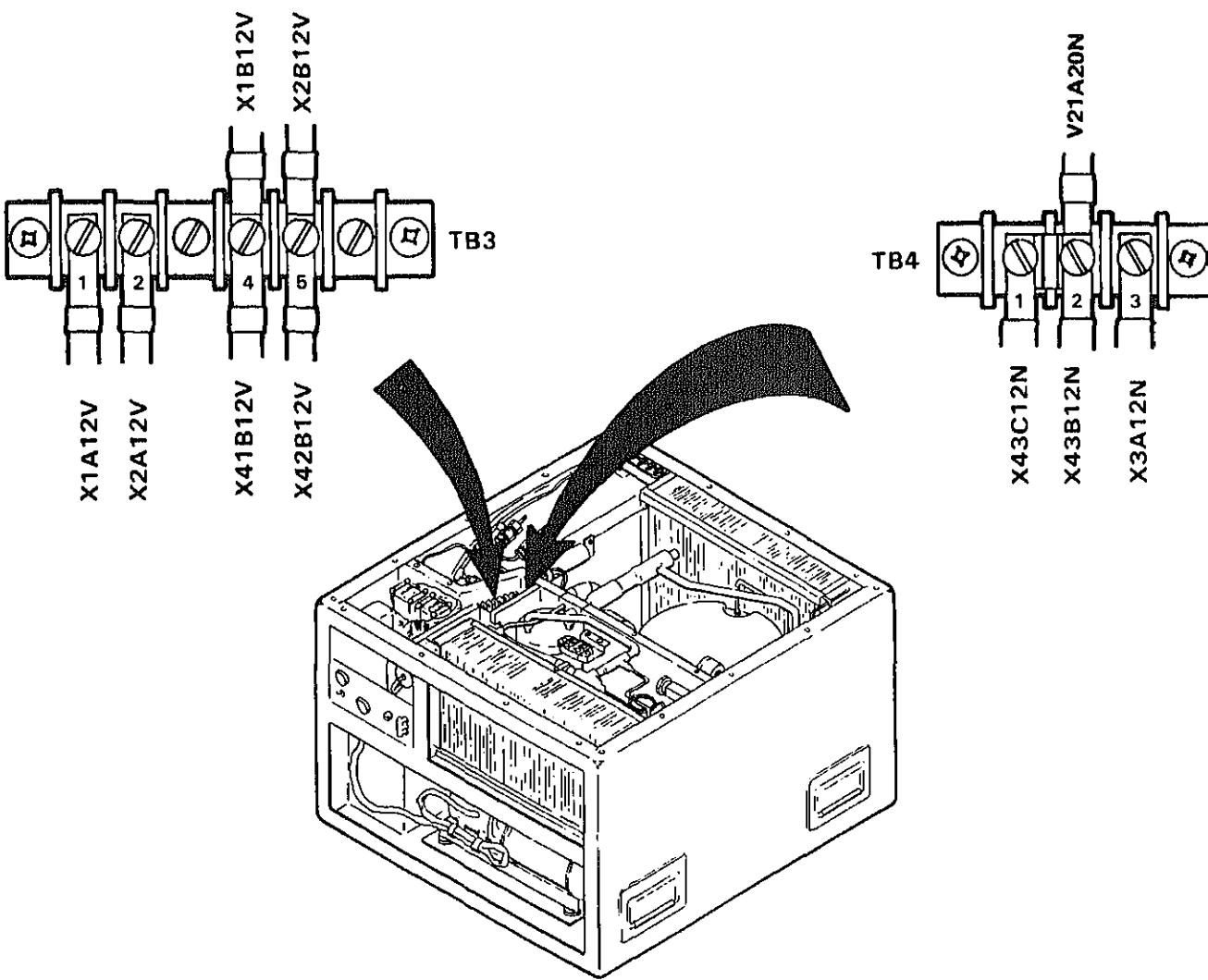
- | | |
|---|---|
| f. Refer to table 3-1 for electric power supply requirements. | There are three models each with different requirement. |
| g. Determine which input power connector is to be used. | Rewire unit at terminal box TB3 and TB4 if necessary. |

WARNING

Do not wire connectors J1 and J11 for use at the same time, nor apply power source to connectors J1 and J11 at same time. You could have unknown HOT connector, radio interference, or you could place two separate power supplies in opposition to each other.

- h. Remove all three top covers.

See tables 3-2, 3-3, and



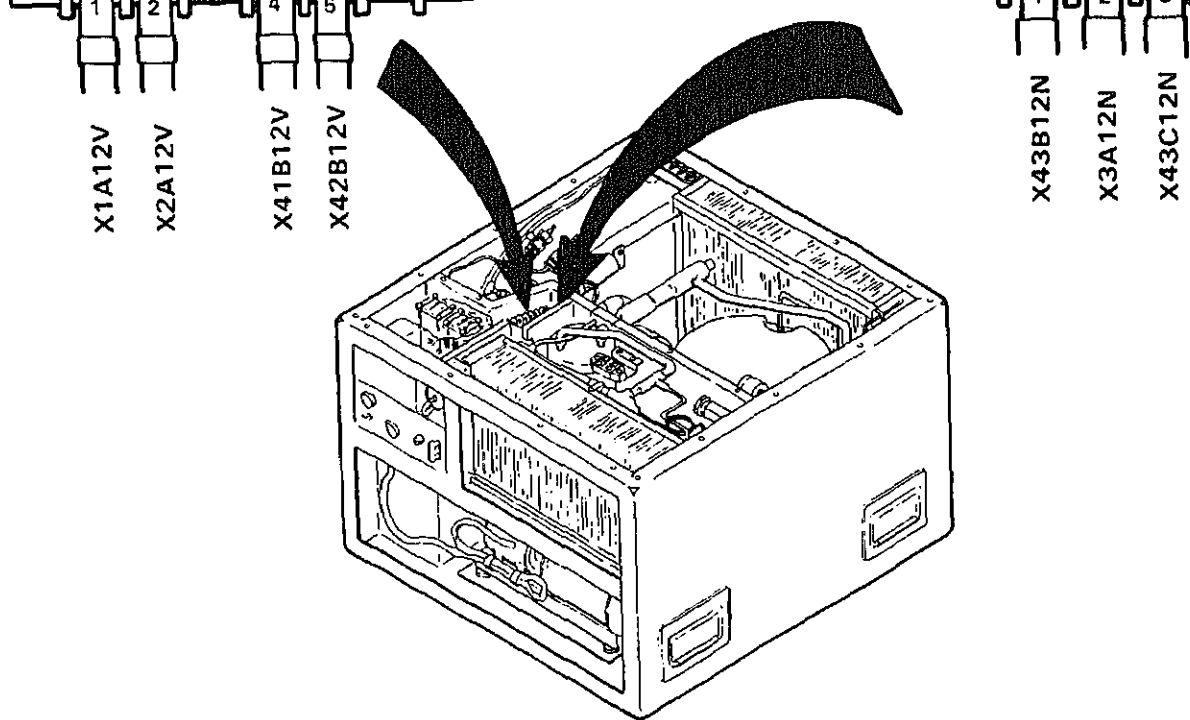
A01333
TM5 4120-387-14-011

Figure 3-3. Connector J11 Wired at Terminal Board TB3 (Single Phase)

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

OR

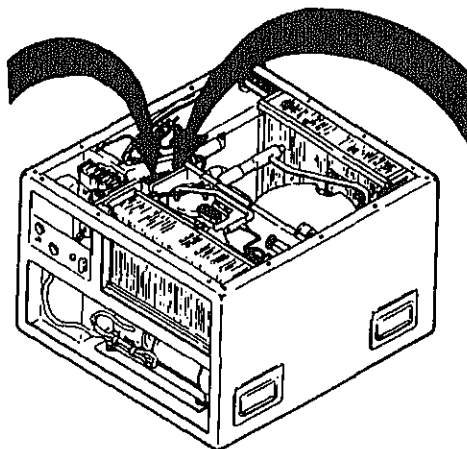
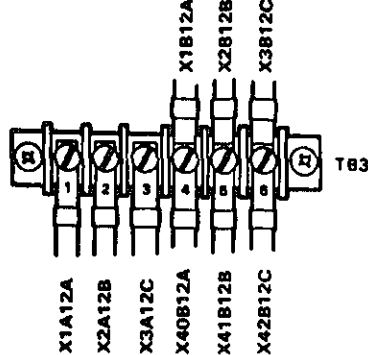
Connector J11 single phase, terminal board TB3	a. Leads X1B12V and X2B12V must be connected to terminal board TB3 terminals 4 and 5	Power supply connected to connector J11 single phase
--	--	--



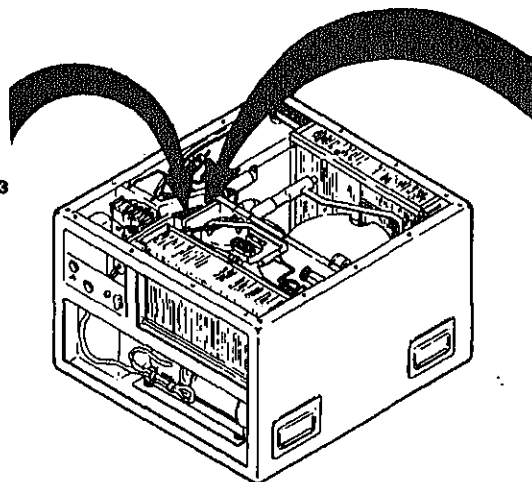
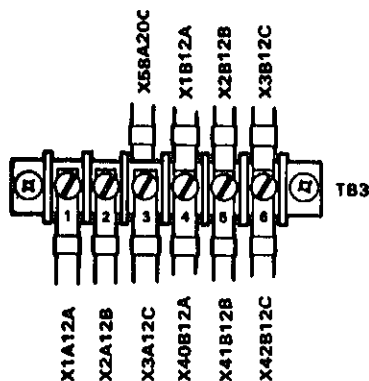
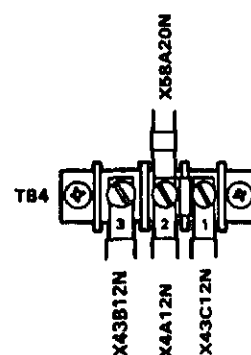
A01334
TM5-4120-367-14-82

Figure 3-4. Connector J1 Wired at Terminal Board TB3 (Single Phase)

LOCATION/ITEM	ACTION	REMARKS
OR		
Connector J1 single phase terminal board TB3	a. Leads X1B12V and X2B12V must be connected to terminal board TB3 terminals 1 and 2.	Power supply connected to connector J1 single phase.
AND		
Connector J1 single phase, terminal board TB4	b. Wire X3A12N must be connected to terminal 2. Wire X43B12N connected to terminal 3.	FO-1. Replace all removed cov



F18H-3 and F18H-4



F18H-3A and F18H-4A

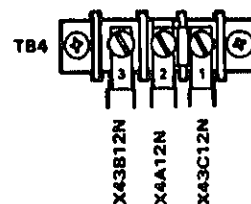


Figure 3-5. Connector J11 Wired at Terminal Board TB3 (Three Phase)

LOCATION/ITEM

ACTION

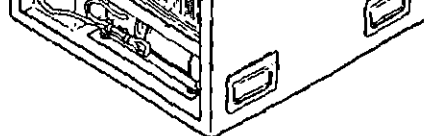
REMARKS

OR

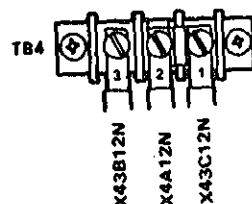
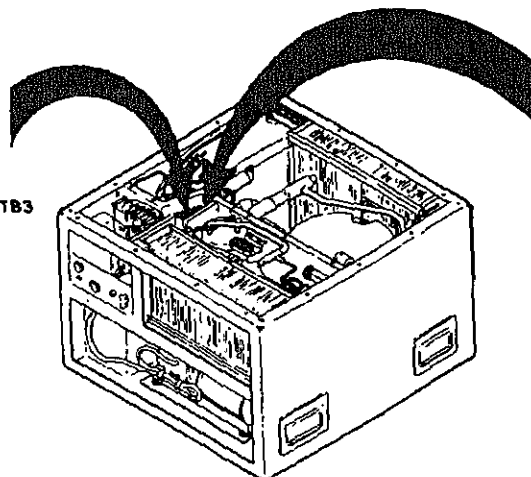
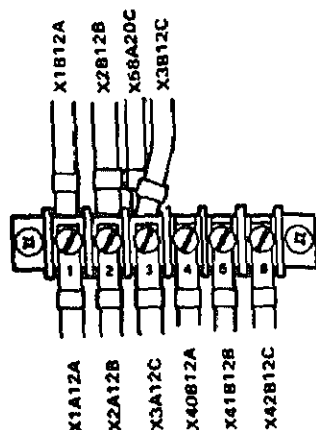
Connector J11 3 phase terminal board TB3

a. Leads X1B12A, X2B12B, and X3B12C must be connected to terminal board TB3

Power supply connected to connector J11 3 phase



F18H-3 and F18H-4



F18H-3A and F18H-4A

Figure 3-6. Connector J1 Wired at Terminal Board TB3 (Three Phase)

LOCATION/ITEM	ACTION	REMARKS
Connector J1 3 phase, terminal board TB3.	a. Leads X1B12A, X2B12B, and X3B12C must be connected to terminal board TB3 terminals 1, 2, and 3.	Power supply connected to connector J1 3 phase
AND		
Connector J1 3 phase, terminal board TB4	b. Wire X4A12N must be connected to terminal 2. Wire X4B12N connected to terminal 3.	FO-2 or FO-3

NOTE

Check on possibilities of removing jumper on terminal board TB4 at this time.

WARNING

Use care in lifting. Air conditioner weighs 256 lbs. (116.1 kg)

Shelter

**AIR CONDITIONER
INSTALLATION IN SHELTER**

a. Lift air conditioner to top of the mounting brackets.

Each side has two lifting handles.

b. Use lifting sling if possible. See figure 3-7.

c. Locate evaporator section inside shelter. Leave space to remove cover from top of evaporator section.

Use care, unit is not mounted or secure and could shift.

d. Level unit on bracket; side to side. Shim as necessary.

INSTALLATION

e. Level unit on bracket, front to back. Shim as necessary.

No more than 5°, Condenser lower than evaporator.

f. Bolt unit to brackets, four places.

Hardware supplied with unit.

g. Fill in and seal area around air conditioner to prevent loss of conditioned air.

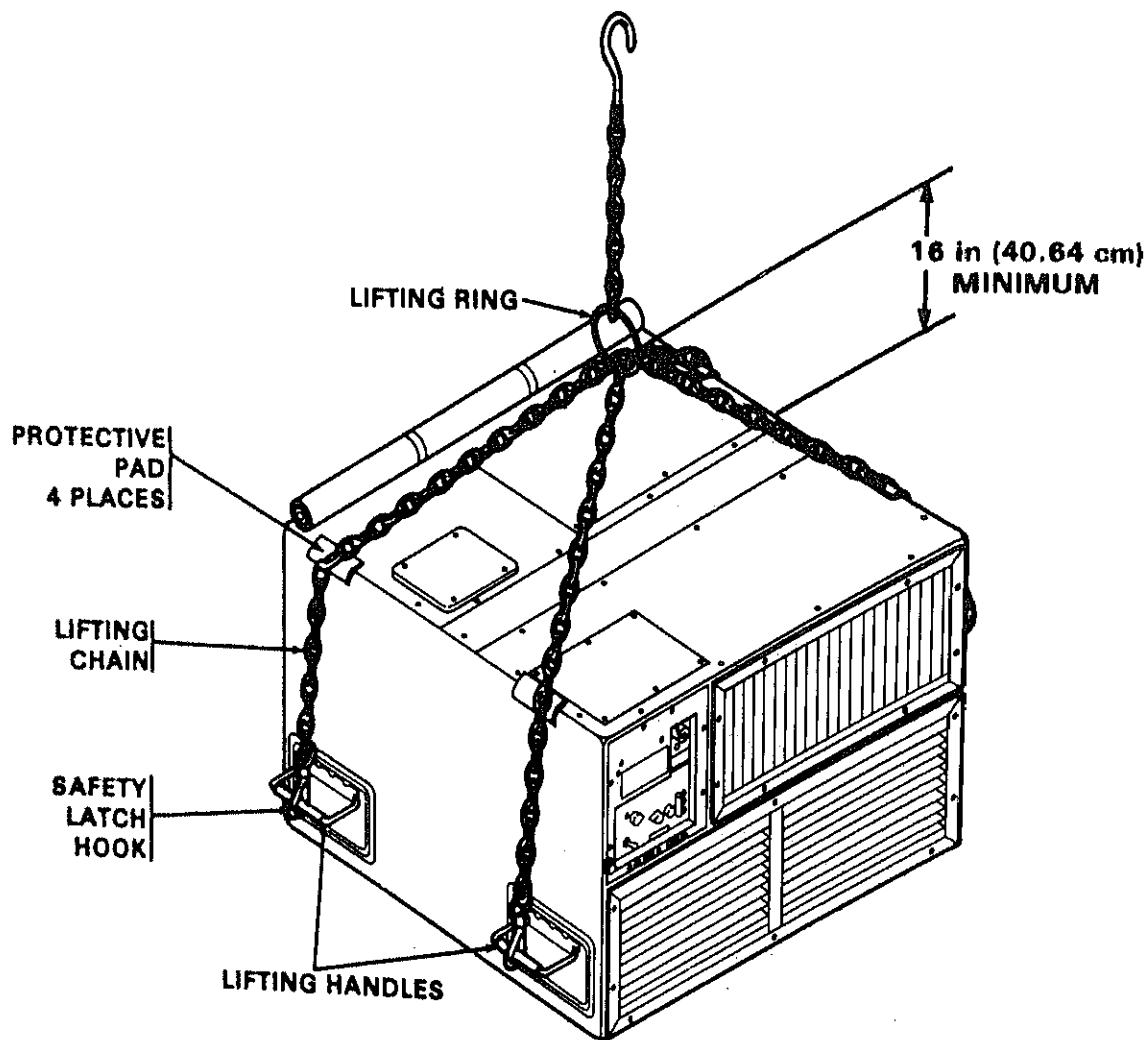
Flexible plastic foam and pressure sensitive tape may be used.

WARNING

For safe operation, user must connect #10 AWG ground wire to the external ground connection. Make certain that shelter is properly grounded.

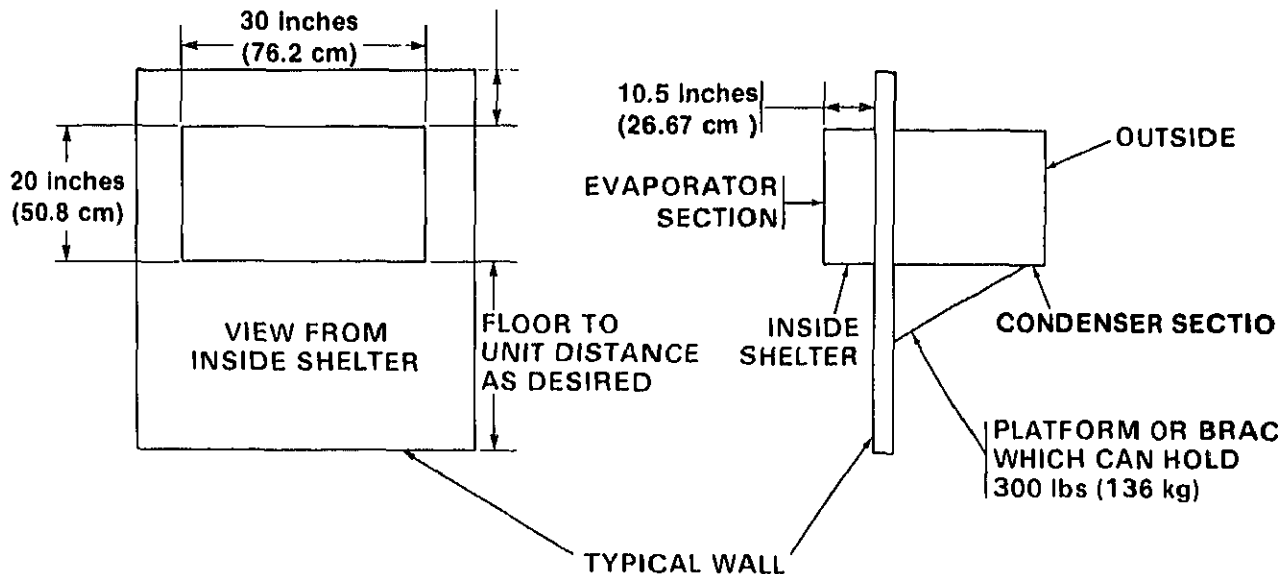
h. Connect #10 AWG ground wire from the

Ground is located below and to



GROSS WEIGHT F18H—278 lbs (126.1 kg)
F18H-3—270 lbs (122.5 kg)
F18H-4—265 lbs (120.2 kg)

24 inches
(60.8 cm)
**SUGGESTED
FOR MAINTENANCE**



AD
TM5-4120-387-1

Figure 3-8. Wall Space Required

INSTALLATION Continued

LOCATION/ITEM	ACTION	REMARKS
Shelter		
Air Conditioner		
DRAIN LINE	a. Connect condensate drain line	Rear of unit, below fresh intake 1/8 - 27 NPT
CHECK POWER SUPPLY	a. Check incoming power supply	Table 3-3. Correct at power supply or main circuit breaker.
	I. Model F18H; check wiring to connector pins of J1 or J11 mating connector.	

WARNING

Power supply circuit breaker must be OFF.
Installation must be checked prior to turning
ON power.

- b. Connect mating power supply connector
to J1 or J11.

INSTALLATION CHECK

- a. Check installation.

Unit ready for operation check-
out. Paragraph 3-6.

- b. Perform steps in paragraph 3-6 before
placing unit in operation.

REMOVAL

- a. Remove power at main circuit breaker.

- b. Disconnect power cable at air conditioner.

- c. Remove insulating material from area
around air conditioner.

- d. Connect sling to lifting handles (4)

- e. Position hoist (wrecker) next to shelter in
order to lift air conditioner.

- f. Connect sling to two handles (one either
side) on condenser section.

WARNING

High voltage can kill.

WARNING

Air conditioner weighs 256
pounds (116.1 kg)

CAUTION

The maintenance personnel **MUST** be visible
to hoist or wrecker operator and in a position
to guide air conditioner away from shelter.

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	<p>g. Connect sling to hoist or wrecker.</p> <p>h. Remove mounting bolts.</p> <p>i. Push air conditioner out of the conditioned area using the sling and hoist to hold and steady air conditioner.</p> <p>j. Attach sling to the front two handles</p> <p>k. Lift air conditioner from mounting bracket and place on truck, transport trailer, or on the ground.</p> <p>l. Remove sling.</p>	<p>Only push to point where sling can be hooked to front two handles.</p>

6. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT

This task covers:

- Rechecking the installation
- Operation of unit

<u>INITIAL SETUP</u>	<u>Personnel Required</u>
<u>Applicable Configurations</u>	Organizational maintenance
All	<u>Special Environmental Conditions</u>
<u>Test Equipment</u>	None
None	<u>General Safety Instructions</u>
<u>Special Tools</u>	See WARNING page
None	<u>References</u>
<u>Materials/Parts</u>	None
None	<u>Troubleshooting References</u>

LOCATION/ITEM	ACTION	REMARKS
SHELTER		
Air conditioner	a. Check that fabric cover is rolled up and secure.	
	b. Check that airflow to and from condenser is free of anything that will block airflow.	
	c. Keep ALL sources of heat at least 10 feet (30.4m) from condenser coil.	
	d. Keep ALL sources of dangerous or objectionable fumes at least 10 feet (30.4 m) from fresh air intake.	Automobile or truck exhaust; refuse containers, fuel containers, etc.
	e. Check electrical connections.	
	f. See Chapter 2, Sections I and III	
	g. Operate unit	
	(1) Cool, high and low (2) Heat, high and low (3) Vent, high and low (4) Fresh air open (5) Fresh air closed	
	h. Check if air conditioner electrically interferes with other shelter electrical equipment.	Ground can be isolated from neutral.
	i. Refer to Paragraph 3-7 for neutral removal procedure.	

7. REMOVE NEUTRAL JUMPER (GROUND ISOLATION)

This task covers:

- a. Removal of neutral jumper

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Refrigeration specialist

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

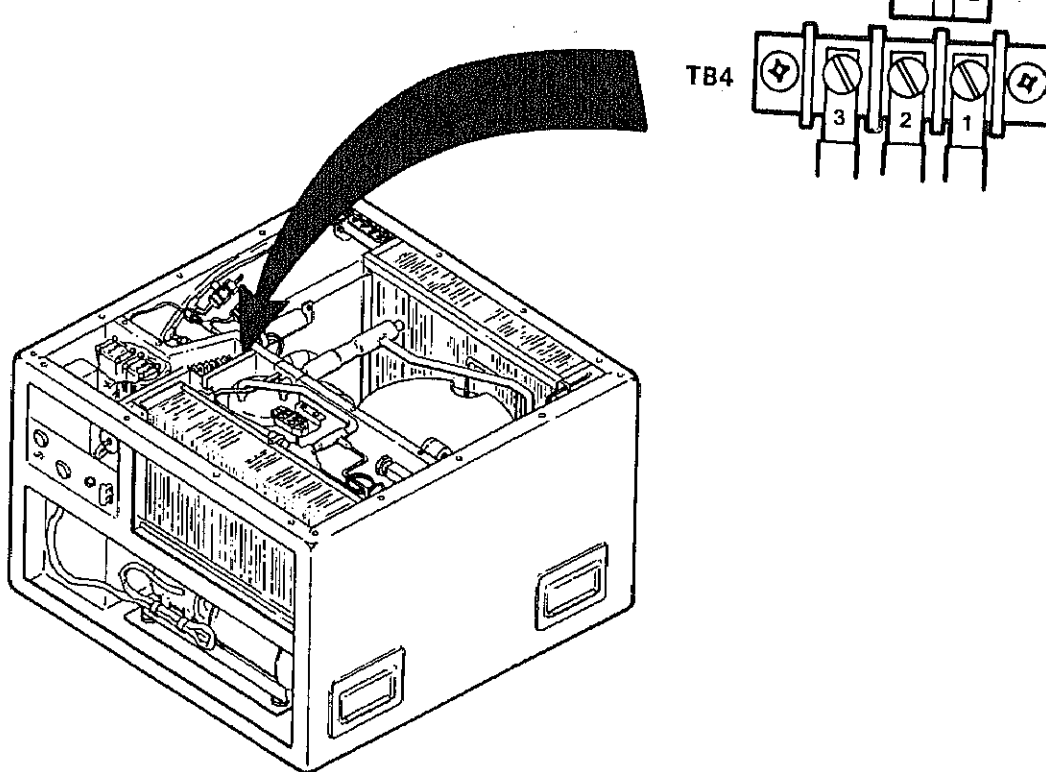


Figure 3-9. Neutral Jumper Removal

A01339
TM5-4120-367-14-87

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		

- Disconnect power supply.
- If unit is installed it must be removed for this procedure.
- Remove all three top covers.
- Remove jumper from terminal board TB4, terminals 1, 2, and 3.

WARNING

High voltage can kill.

Paragraph 3-5.

AL JUMPER Continued

AL

- e. Place tag on air conditioner to indicate that NEUTRAL jumper has been removed.
- f. Replace top covers.
- g. Install air conditioner.
- h. Double check that unit is grounded.

Paragraph 3-5

LOW PRESSURE CUTOUT JUMPER

covers:

mpner across Low Pressure Cutout (LPCO)

ETUP

le Configurations

pment

ools

s/Parts

Personnel Required

Utilities Equipment Repairer

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

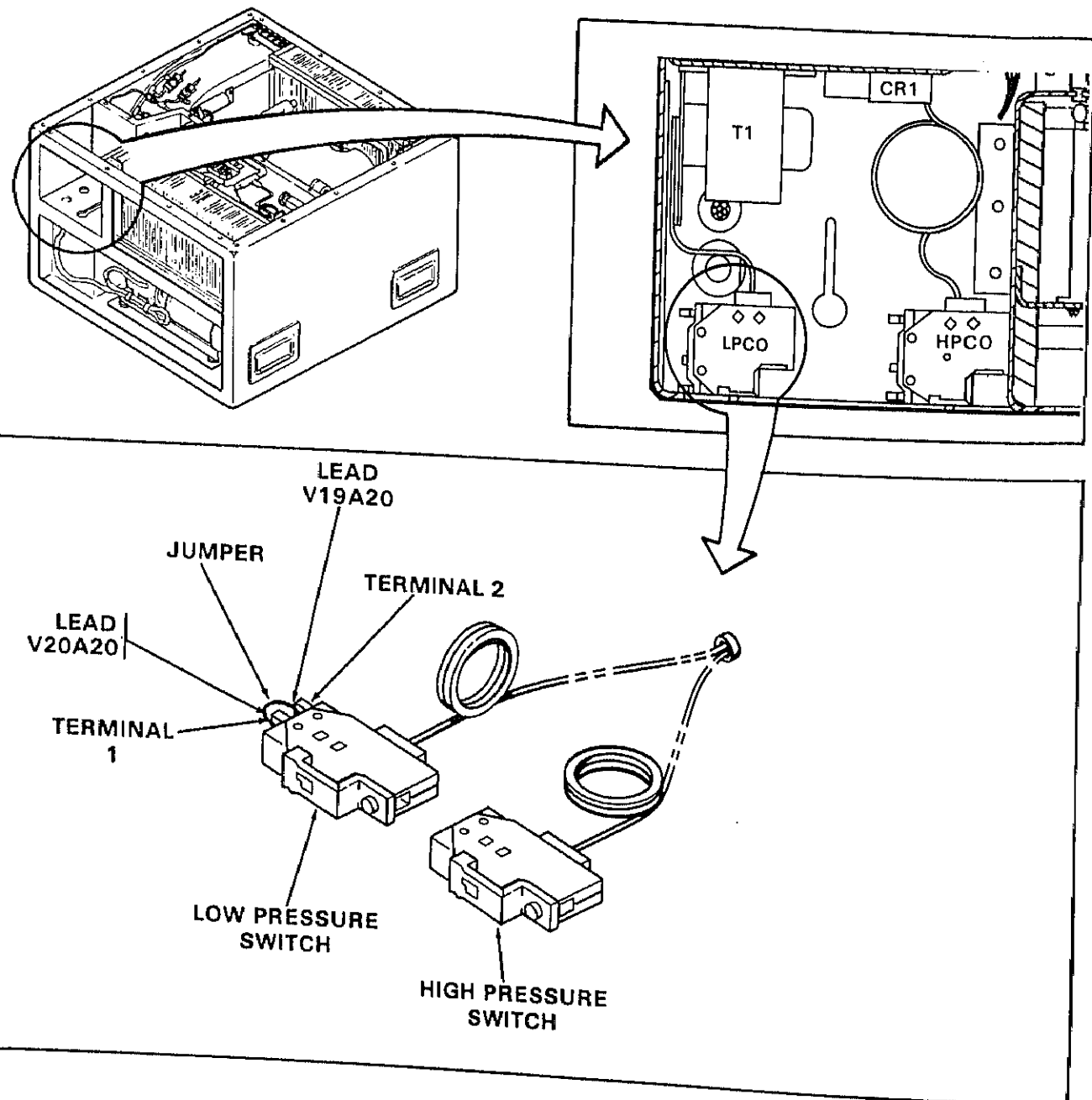


Figure 3-10. Jumper Across LPCO

LOCATION/ITEM	ACTION	REMARKS
LPCO Jumper	a. Disconnect power supply to air conditioner	<div data-bbox="1031 148 1202 206">WARNING</div> <p>Shut off power before beginning any maintenance. High voltage can kill.</p>
	b. Remove cover from top of evaporator section.	<div data-bbox="1031 422 1202 480">CAUTION</div> <p>Sensing line is copper tube connected between TEMP-ERATURE SELECTOR and SENSING BULB which is behind the return air louver.</p>
	c. Remove screws and pull control panel from frame. Use care to avoid breaking or kinking the sensing line.	<div data-bbox="1031 599 1202 658">CAUTION</div> <p>Check that jumper will not short out against frame of control panel.</p>
	d. Place jumper between terminals 1 and 2 of low pressure contact	<div data-bbox="1031 658 1202 716">CAUTION</div> <p>Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.</p>
	e. Fabricate CAUTION tag to place on control panel to show that low pressure cutout has been bypassed.	<div data-bbox="1031 870 1202 928">CAUTION</div> <p>Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.</p>
	f. Push control panel back into frame. Use care to avoid breaking or kinking sensing line and the LPCO jumper.	<div data-bbox="1031 990 1202 1048">CAUTION</div> <p>Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.</p>
	g. Replace top cover	<div data-bbox="1031 1109 1202 1167">CAUTION</div> <p>Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.</p>
	h. Connect power supply.	<div data-bbox="1031 1228 1202 1287">CAUTION</div> <p>Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.</p>
	i. Remove jumper when outside temperature increases to 40°F (5°C)	<div data-bbox="1031 1348 1202 1406">CAUTION</div> <p>Air conditioner low pressure cutout has been bypassed. Compressor will not shut off under low suction pressure conditions.</p>

Table 3-5. PREVENTIVE MAINTENANCE CHECKS
AND SERVICES DAILY

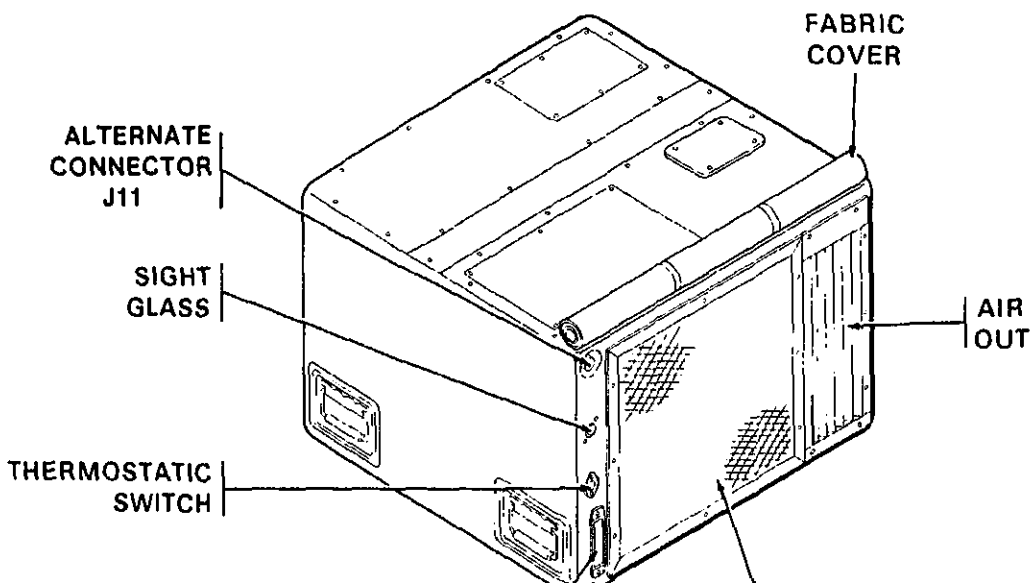
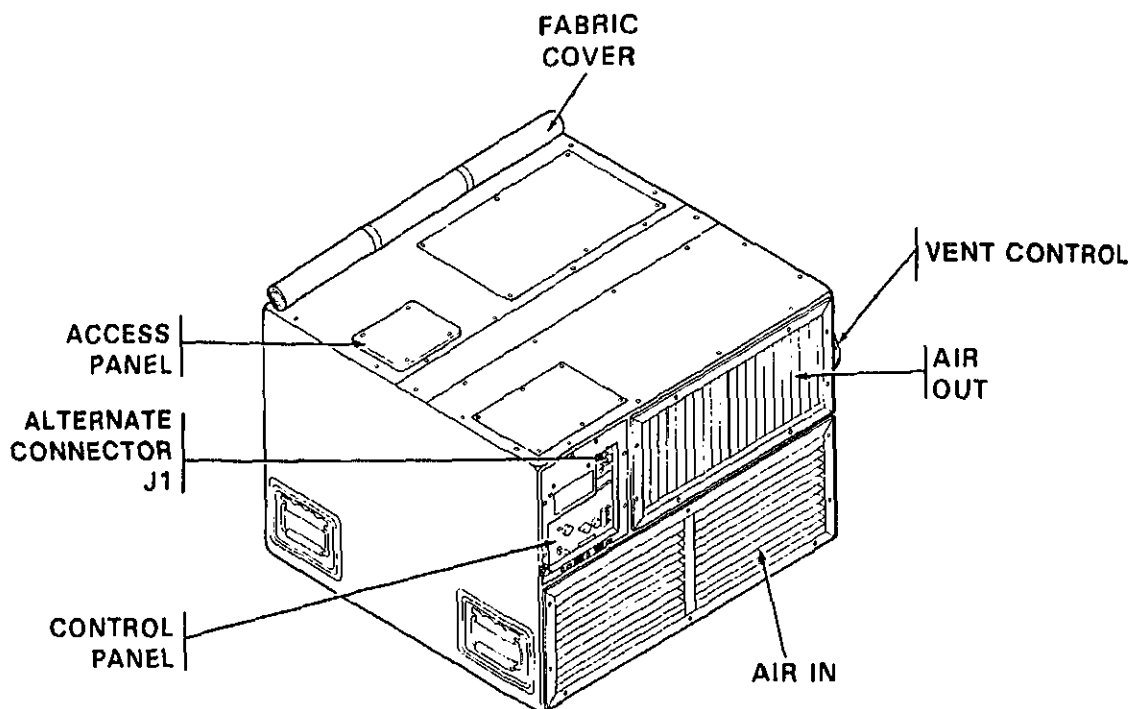


Table 3-5. PREVENTIVE MAINTENANCE CHECKS
AND SERVICES DAILY (CONTINUED)

Item
To Be
Inspected

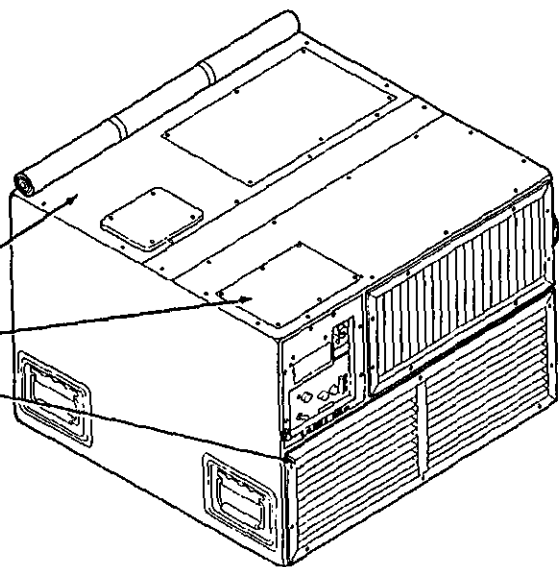
Procedures

NOTE

All checks and services may be made while the air conditioner is on the shelter

. All outside
covers and
information
plates

- No major dents
- No cracks
- No screws missing



Covers and gaskets should seal
against air leaking in

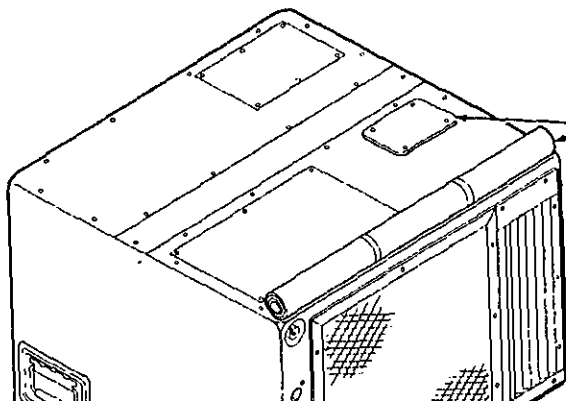
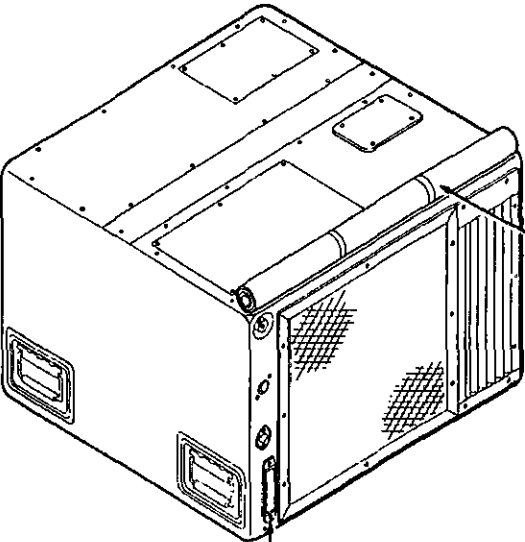
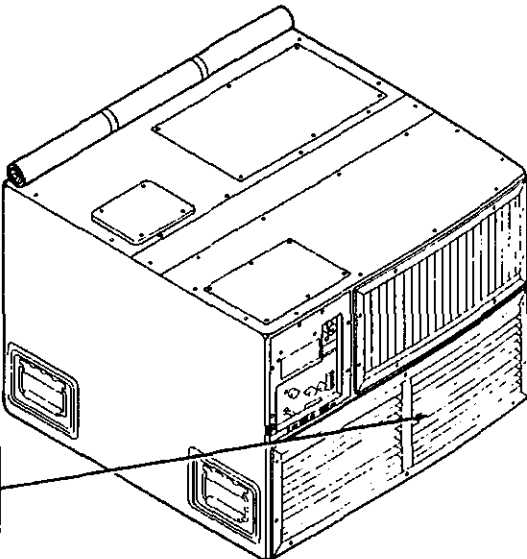


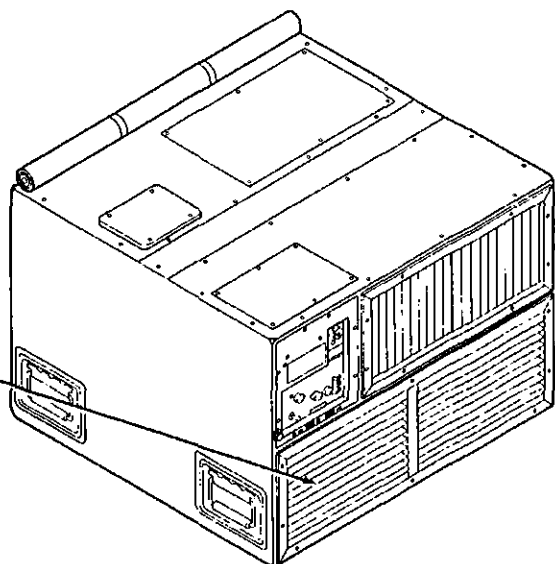
Table 3-5. PREVENTIVE MAINTENANCE CHECKS
AND SERVICES DAILY (CONTINUED)

Item No.	Item To Be Inspected	Procedures
2	Condenser Cover	 <ul style="list-style-type: none"> • No mildew, tears or worn edges • All snaps in good condition
3	Condensate Drain	<p data-bbox="267 952 690 1032">Check after air conditioner has been running for a while</p>  <p data-bbox="267 1316 690 1396">No water dripping anywhere except through drain</p>

**Table 3-5. PREVENTIVE MAINTENANCE CHECKS
AND SERVICES DAILY (CONTINUED)**

Procedures

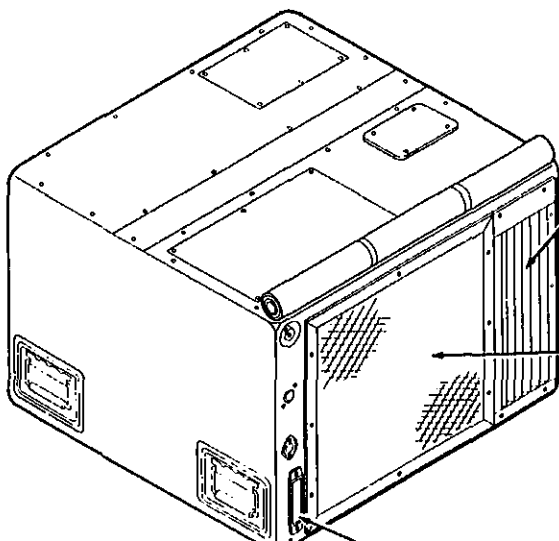
- Air intake clear
- Filter clean

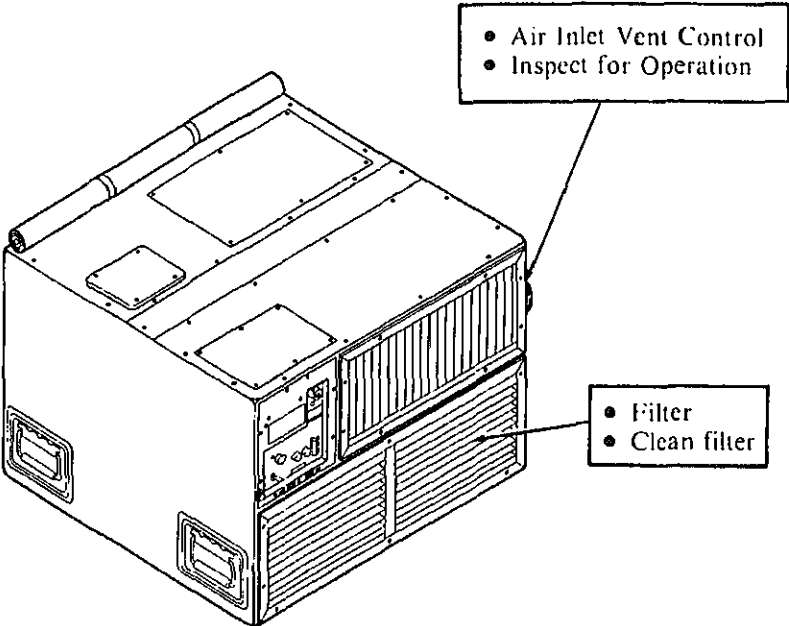


- Air discharge clear
- Guard not damaged

- No source of fumes or heat within 10 feet of unit

- Air intake clear
- Guard not damaged



Item No.	Item To Be Inspected	Procedures
6	Return Air Filter and Air Inlet Vent Control	 <p>The diagram shows a perspective view of a rectangular return air filter unit. It has a top panel with two square access points and a cylindrical vent on the left side. The front face features a large vertical grille and a smaller horizontal grille below it. Two callout boxes are present: one pointing to the top right corner of the unit and another pointing to the front grille.</p> <ul style="list-style-type: none"> • Air Inlet Vent Control • Inspect for Operation <ul style="list-style-type: none"> • Filter • Clean filter

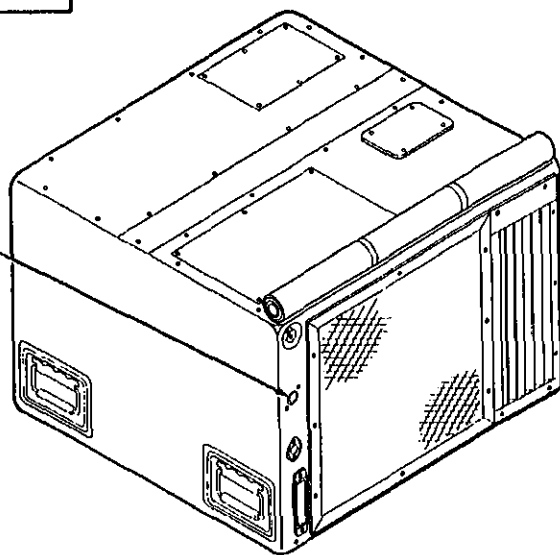
Sight
Glass

Check after air conditioner has been
running (cool mode) for 15 minutes

Check Moisture
Indicator

Center should be clear with
no bubbles

- Green - no moisture
- Chartreuse - moisture
- Yellow - replace drier/
filter and refrigerant



CHAPTER 4

TROUBLESHOOTING

TROUBLESHOOTING

This section contains troubleshooting information for diagnosing and correcting most of the operating troubles that may develop in the air conditioner.

NOTE

This is a combined troubleshooting covering Organizational, Direct and General Support maintenance. Refer to the Maintenance Location Chart (MAC), Appendix D for maintenance authorized to your level of maintenance.

When using the troubleshooting guides, perform an initial check. If possible, isolate the problem to either a component failure or control failure.

WARNING

Do not connect power from the air conditioner while doing any maintenance work to the electrical system. High voltage in air conditioner can kill you.

WARNING

Never work on this equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Be careful not to contact high voltage connections. Keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body. Do not be misled by term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.

NOTE

At outside temperatures below 0° F (-18° C) LPCO will have to be jumped to operate in COOL mode.

TABLE 4-1. OPERATIONAL STATUS

Component	Cool		Vent		Heat	
	High	Low	High	Low	High	Low
Compressor	On	On	Off	Off	Off	Off
Indoor Fan	On HIGH or LOW	On HIGH or LOW	Off	Off	Off	Off
Outdoor Fan	On HIGH	On LOW	On HIGH	On LOW	On HIGH	On LOW
Refrigerant Valve L1	On	On	Off	Off	Off	
Refrigerant Valve L2	On/Off	On/Off	Off	Off	Off	Off
1st Stage	Off	Off	Off	Off	On	

TABLE 4-2. TROUBLESHOOTING SYMPTOM INDEX

Primary Symptom	Secondary Symptoms/Conditions				Troubleshooting Procedures Paragraph
	Compressor	Evaporator Blower	Condenser Blower	Heaters	
Air Conditioner Fails To Start In Any Mode	X	X	X	X	4-2
Evaporator Blower Fails To Start	Starts	X	Starts	Heats	4-3
Compressor Fails to Start	X	Starts	X Starts	NA	4-4
Condenser Fan Fails to Start	Starts X	Starts	X	NA	4-5
Little Or No Cooling Action	Starts	Starts	Starts	NA	4-6
Cooling Action Stops After Operating For Short Time	X	X	X	NA	4-7
Little Or No Heating In Low Heat Mode	NA	Starts	NA	X Some Heat X No Heat	4-8
Little Or No Additional Heating In High Heat	NA	Starts	NA	X Some additional heat X No additional heat	4-9
Temperature Selector Effective	Starts	Starts	Starts		4-10
Unusual Noise Or Vibration	Starts	Starts	Starts	Starts	4-11
Unit Runs In COOL, But Discharge air is warm	Starts	Starts	Starts	NA	4-12
Frosted Evaporator Coil	Starts	Starts	Starts	NA	4-13
Excessive Head Pressure	Starts and Stops	Starts	Starts	NA	4-14
Low Head Pressure	Starts	Starts	Starts	NA	4-15
Excessive Suction Pressure	Starts	Starts	Starts	NA	4-16
Low Suction Pressure	Starts and Stops	Starts	Starts	NA	4-17

Check across terminals 2 and 3 to see that contact is made within 30 ± 3 seconds of energizing the coil. Replace defective relay. See paragraph 5-8.

3. **Relay K2 and K3.** Test each relay in the same manner. Apply 28 volts DC to terminals X1 and X2; positive to X1, negative to X2. Check continuity of pairs: A1 - A2, B1 - B2, and C1 - C2. Replace defective relay. See paragraph 5-9.
4. **Relay K4.** Relay K4 is a 11 pin continuous duty, three pole, double throw, 24 volt DC coil relay. When the coil is activated by thermostatic switch S7, contacts 1 - 3, 5 - 11, and 10 - 8 open, and terminals 1 - 4, 5 - 6, and 10 - 7 close. See paragraph 5-7.

NOTE

Pins 5 - 6 and 5 - 11 are not used in single phase unit model F18H.

Apply 28 volts DC to terminals 2 and 9; positive to terminal 2, negative to terminal 9. Check continuity. Terminals (contacts) 1 - 3, 5 - 11, 10 - 8 should be closed, 1 - 4, 5 - 6, 10 - 7 should be open. Remove the power terminals 1 - 4, 5 - 6, 10 - 7 should be closed, 1 - 3, 5 - 11, 10 - 8 should be open. Replace defective relay.

5. **Transformer T1.** Apply 115 volts AC, 120 watts, to input terminals 1 and 2 (F18H, F18H-3 or F18H-4) or 2 and 5 (F18H-3A or F18H-4A). Voltage at output terminals 3 and 4 (F18H, F18H-3 or F18H-4) or 7 and 8 (F18H-3A or F18H-4A) should be 28 to 30 volts AC, 4 amps. Remove power from transformer. Replace defective transformer. See paragraph 5-6.
6. **Rectifier CR1.** Apply 28-30 volts AC to rectifier terminals 1 and 3. Output at terminals 4 and 2 should be 26 to 30 volts DC. Terminal 4 is negative, 2 is positive. Replace faulty rectifier. See paragraph 5-5.
7. **Mode selector switch S1.** Check continuity of selector switch in all positions. See table 4-4 or 4-5. See paragraph 5-10.
8. **Temperature Selector S3.** Remove the return air louver and air filter. Carefully remove the sensing bulb from the clamped position. Place the sensor bulb in a container of warm water 85°F to 100°F (30° to 40°C). Turn knob from the extreme WARMER to extreme COOLER position. Continuity should be indicated. See paragraph 5-11.

Place the sensor bulb in a container of cold water 40° to 65°F (5° to 18°C). Turn the knob from the extreme COOLER to the extreme WARMER position. Continuity should be indicated.
9. **Fan Speed switch S2.** Check continuity in both positions. Continuity should be indicated. See paragraph 5-12.
10. **Motors B2 and B3.** Disconnect power from the unit. Spin the fan/blower. Listen for bearing noise. If bearing noise is evident, turn shaft slowly backward and forward to check for roughness. Use multimeter and check that no continuity exists between each pin and motor frame. Replace defective motor. See paragraph 6-29.

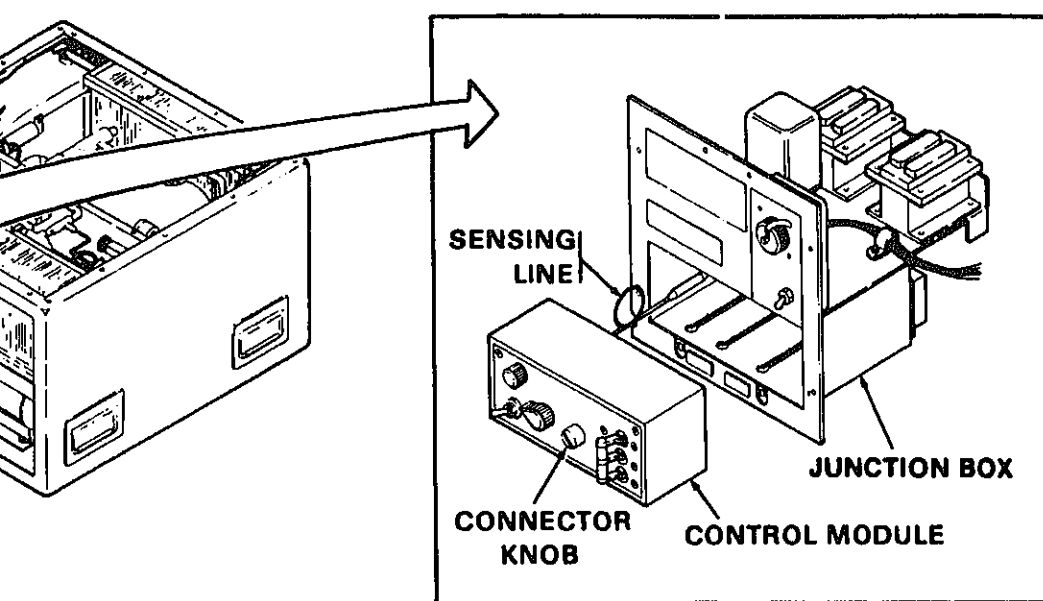
TABLE 4-3. ELECTRICAL COMPONENTS TESTS (CONTINUED)

No.	Procedure
11.	Relay K5. (Single phase only). Apply 230 volts single phase, 60 hertz to terminals 1 and 5. Contact which is across 1 and 2 should open at voltage rise between 180 to 190 volts. Remove voltage. Contact should close upon voltage drop between 115 and 55 volts. Rating of relay is 5180 ohms. See paragraph 5-17.
12.	Condenser fan switch S7. Tape the bulb of a thermometer or junction of a thermocouple to the sensing part of the switch. Disconnect plug P7 and connect multimeter to the connector. Gradually apply heat and observe both the thermometer and multimeter. Contact shall be open until temperature reaches 100° F (38° C) and above, at which time contact should close. Allow temperature to drop. Contact should open at below 100° F (38° C). Remove meter and connect plug. See paragraph 5-26.
13.	Heater Thermostat S6. Visually inspect the heater thermostat for cracks in the housing, missing pieces or other damage. Replace. See paragraph 5-27. a. Using a multimeter check continuity of the wire leads attached to terminals 1 and 2, 3 and 4 of the heater thermostat. Continuity should be indicated. b. Tape the bulb of a thermometer or junction of a thermocouple to the body of the heater thermostat, and leave the continuity tester connected to terminals one and two. Gradually apply heat, and observe both the thermometer and the continuity tester. Continuity should drop out at $194^{\circ} \pm 9^{\circ} \text{ F}$ ($90^{\circ} \pm 5^{\circ} \text{ C}$). While still continuing to watch the thermometer and the continuity tester, let the heater thermostat cool. Continuity should be re-established at $142^{\circ} \pm 17^{\circ} \text{ F}$ ($61^{\circ} \pm 9^{\circ} \text{ C}$). c. Repeat step b with the meter connected to terminal 3 and 4. d. If the heater thermostat does not meet temperature and continuity requirements, replace it.
14.	Heater HR1 thru HR6. The six steel sheathed resistance heating elements are located immediately behind the evaporator coil, and extend all the way across the width of the evaporator. Three of the elements are energized when the selector switch is set at LOW HEAT, and all six elements are energized when the selector switch is set at HIGH HEAT. The temperature control thermostat controls only the elements energized by the LOW HEAT setting. All six elements are protected against overheating by a thermal overload protector (heater thermostat). See paragraph 5-28.

WARNING

Hot heaters can cause severe burns.

- a. Visually inspect each heating element from damage, deformation, damaged terminal threads, cracked or broken sheath, or burnt-out spots.



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TM5-4120-367-14-7

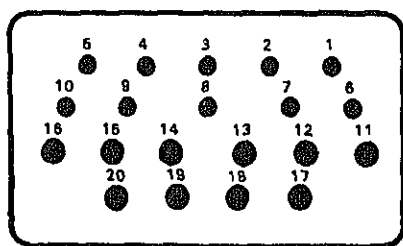
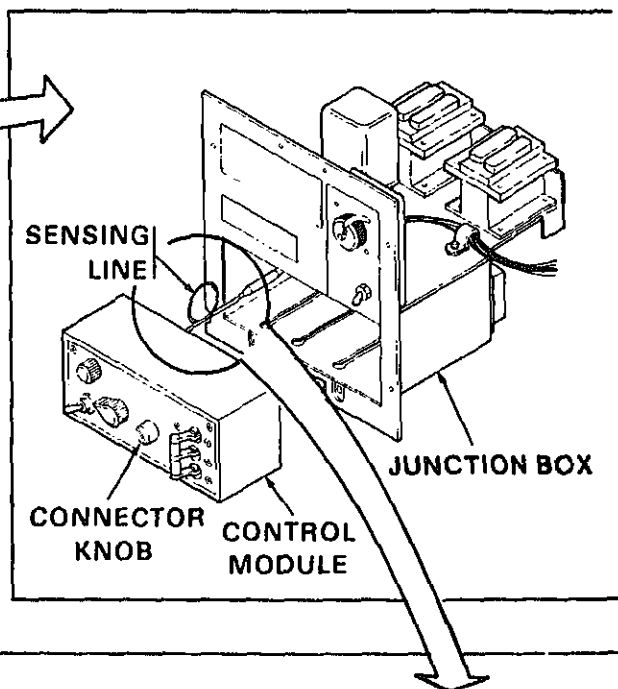
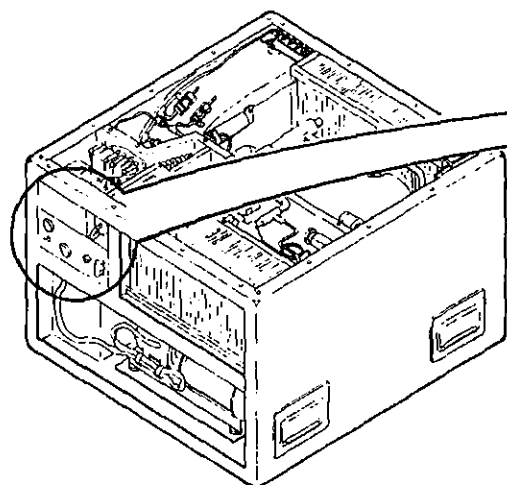
NOTE

Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is located behind return air louver.

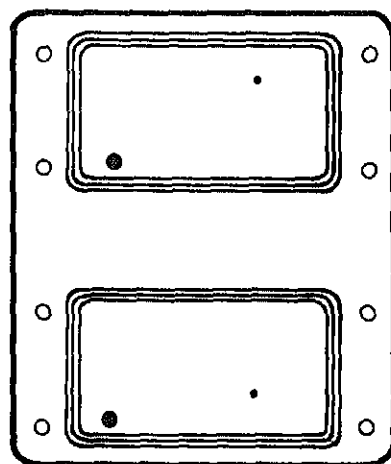
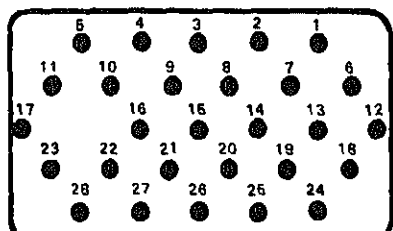
Figure 4-1. Junction Box and Control Panel Removal

NOTE

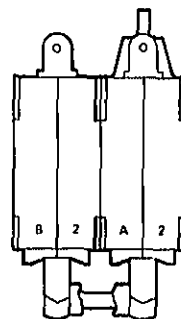
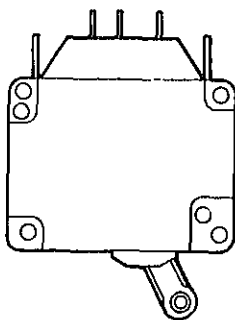
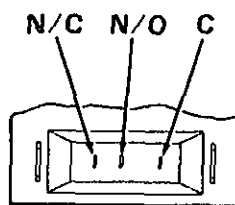
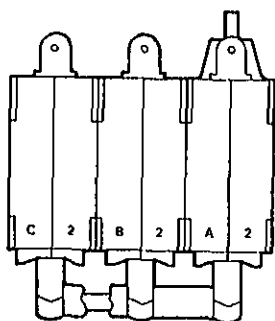
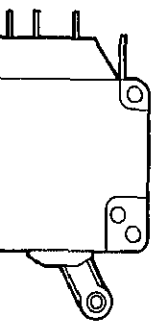
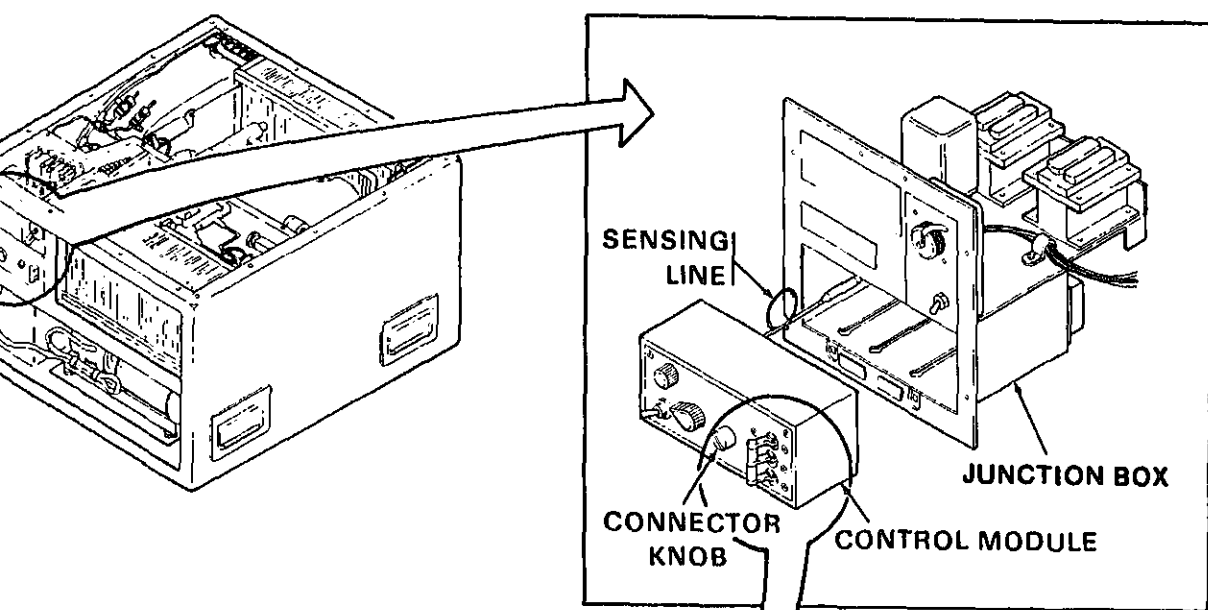
The connector knob was supplied on units prior to 1983. This knob is not supplied on F18H-3A or F18H-4A units and is not required on existing F18H, F18H-3 or F18H-4 units. Use screw driver slot in end of shaft.



PIN ARRANGEMENT A
TOTAL CONTACTS 20



CONNECTOR J2



CIRCUIT BREAKER CB1 THREE PHASE

CIRCUIT BREAKER CB1 SINGLE PHASE

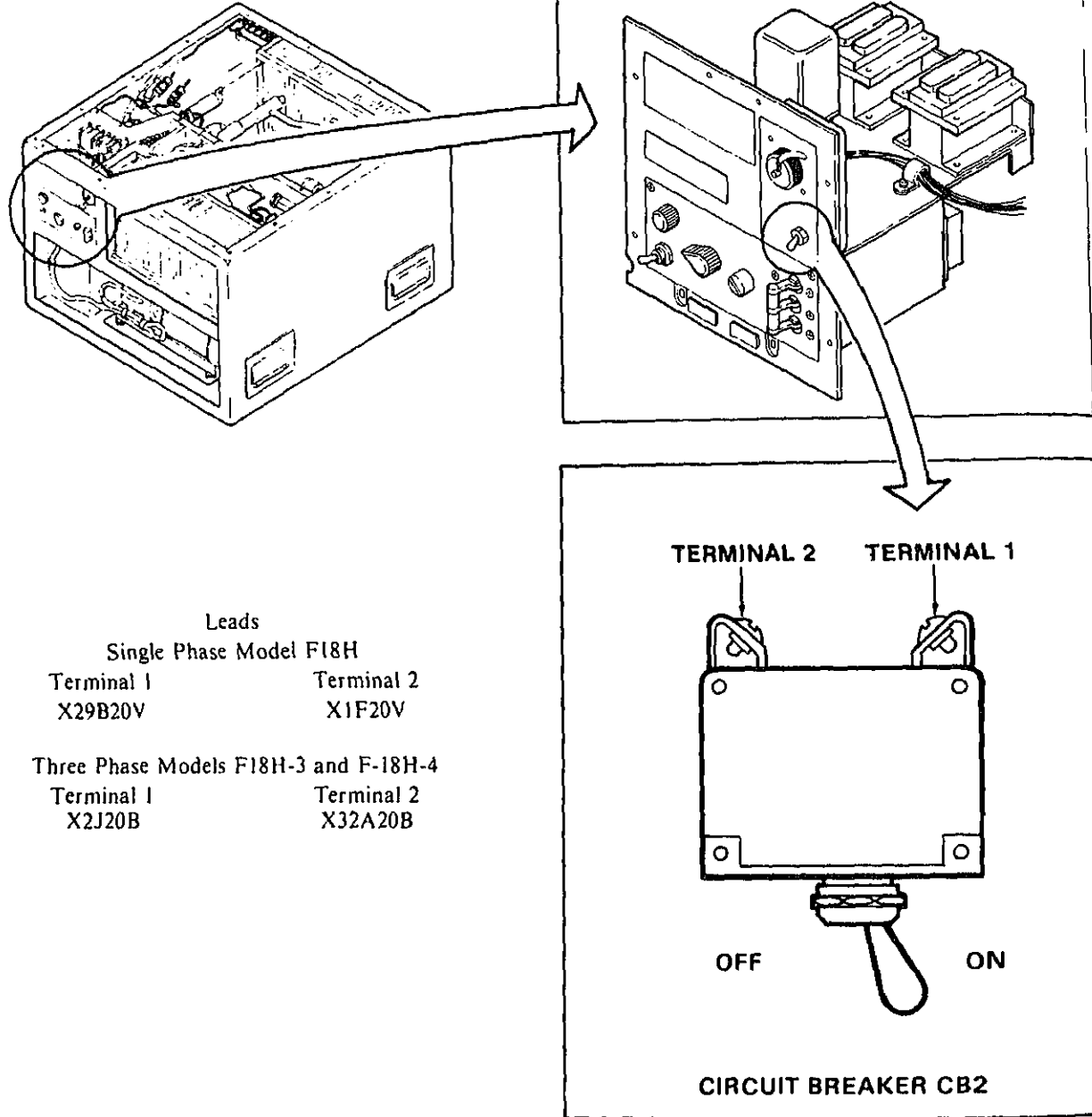
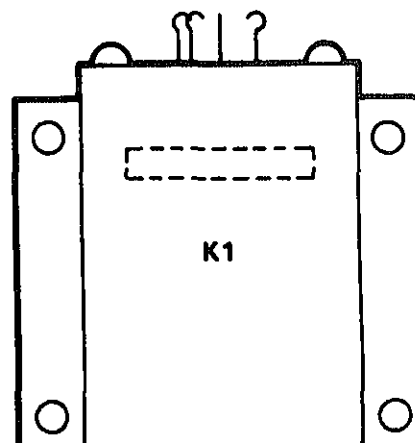
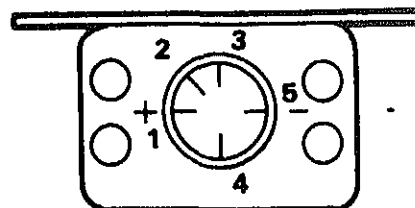
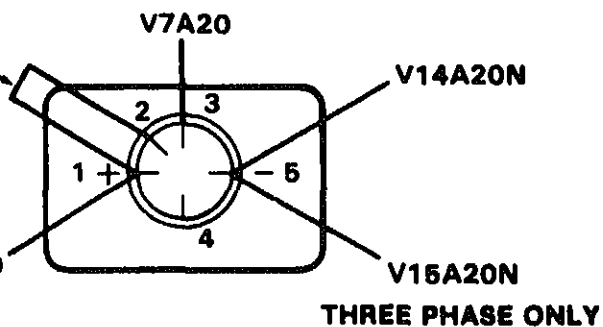
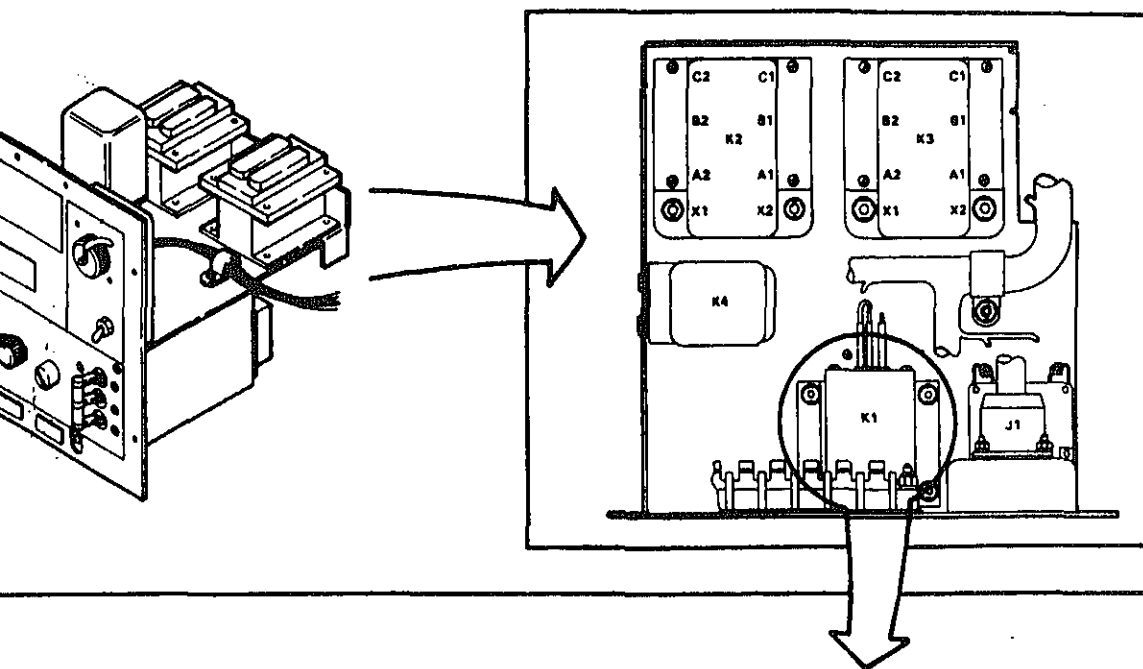
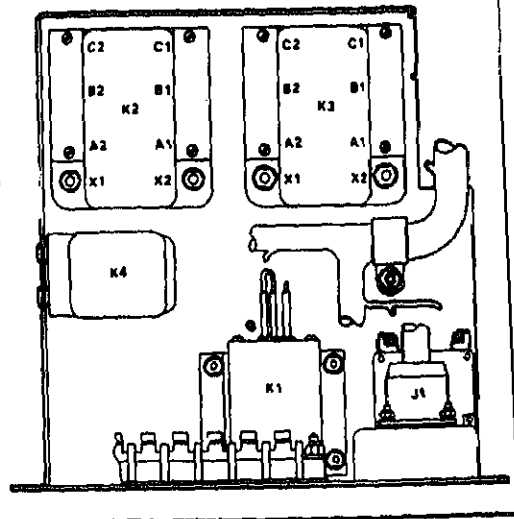
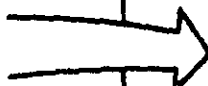
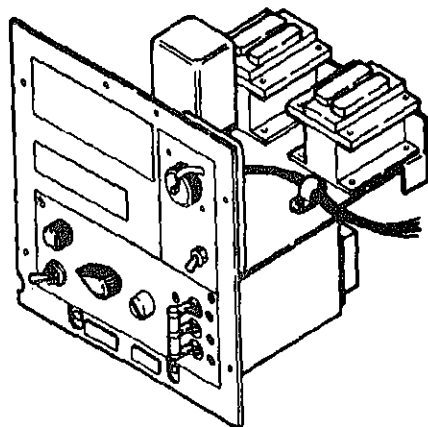


Figure 4-4. Terminal Location, Circuit Breaker CB2





MODEL F18H RELAY K2

WIRE NO.	TERMINAL NO.
X1E16V	A1
X2E16V	B1
Blank	C1
V3A20	X1
X32A16V	A2
X17B16V,	B2
X31A16V	
Blank	C2
V15A20N,	X2
V17A20N	
and V16A20N	

MODEL F18H RELAY K3

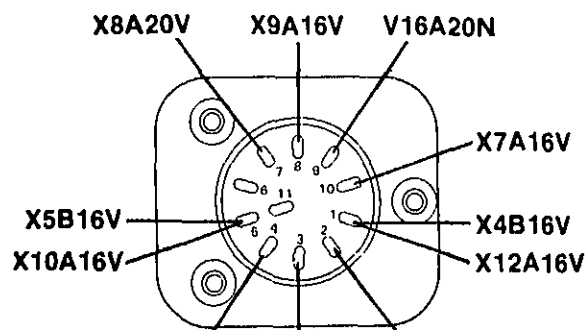
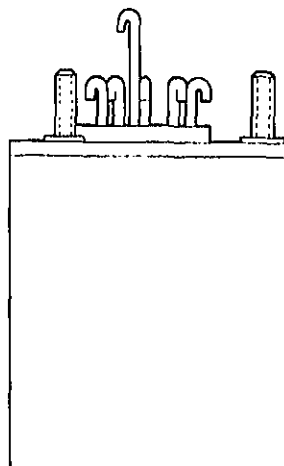
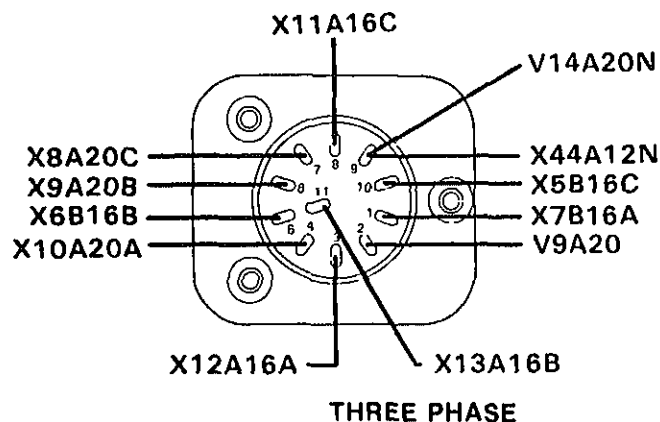
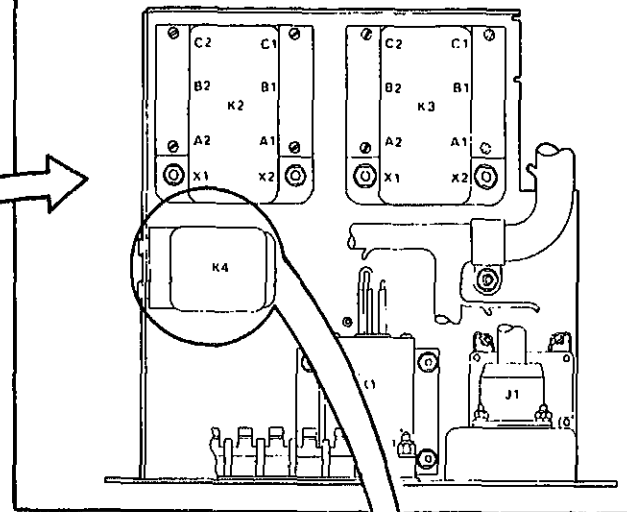
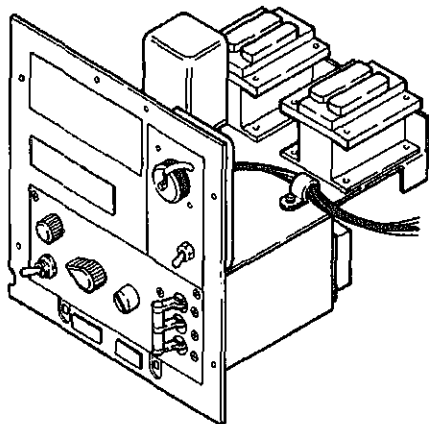
WIRE NO.	TERMINAL NO.
X19C16X,	A1
X19B12V	
X23B12V,	B1
X23C16Y	
Blank	C1
V8A20, V7A20	X1
X20A12V,	A2
X21A12V	
X24A12V	B2
Blank	C2
V10A20N	X2

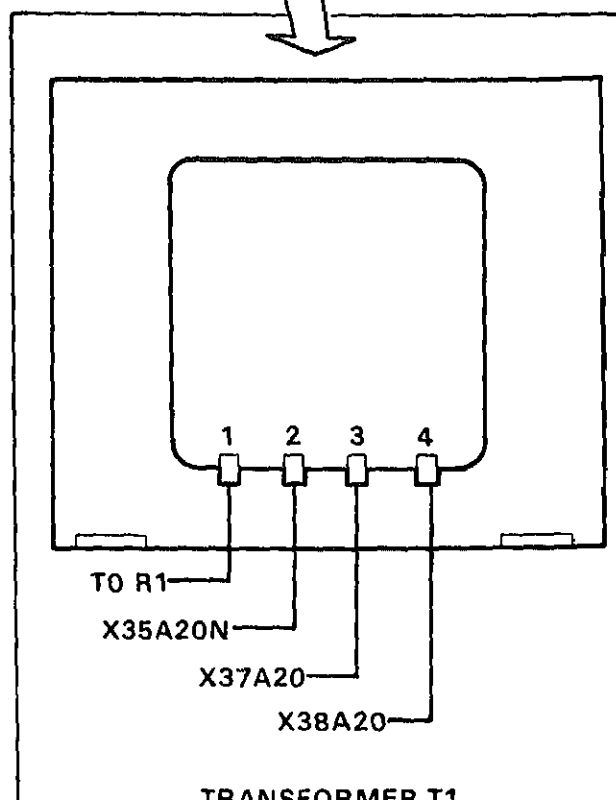
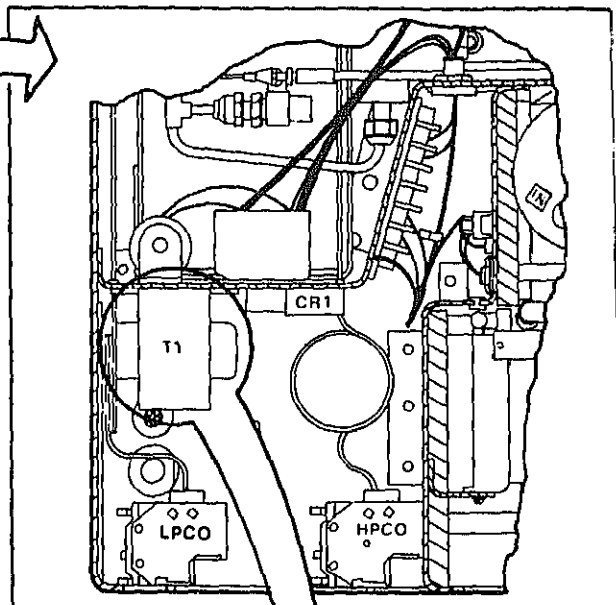
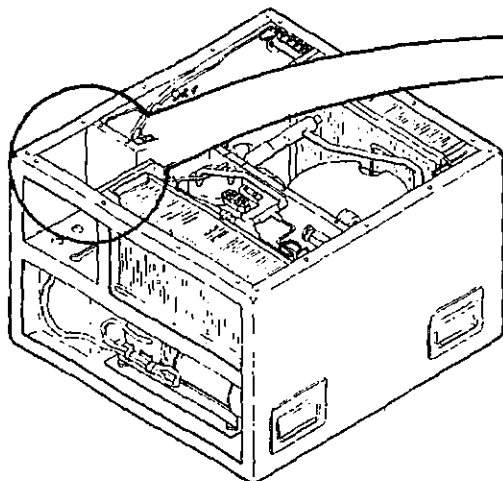
MODELS F18H-3 & KIF-18H-4 RELAY K1

WIRE NO.	TERMINAL NO.
X1E16A	A1
X2J20B, X2E16B	B1
X3E16C	C1
V3A20	X1
X39A16A	A2
X60A16B	B2
X59A16C	C2
V15A20N,	X2
V16A20N	
and V17A20N	

MODELS F18H-3 & KIF-18H-4 RELAY K2

WIRE NO.	TERMINAL NO.
X20C16B,	A1
X20B12A	
X22B12B,	B1
X22C16B	
X24B12C	C1
V7A20, V8A20	X1
X21A12A	A2
X23A12B	B2
X25A12C	C2
V10A20N,	X2
V17A20N	
and V18A20N	





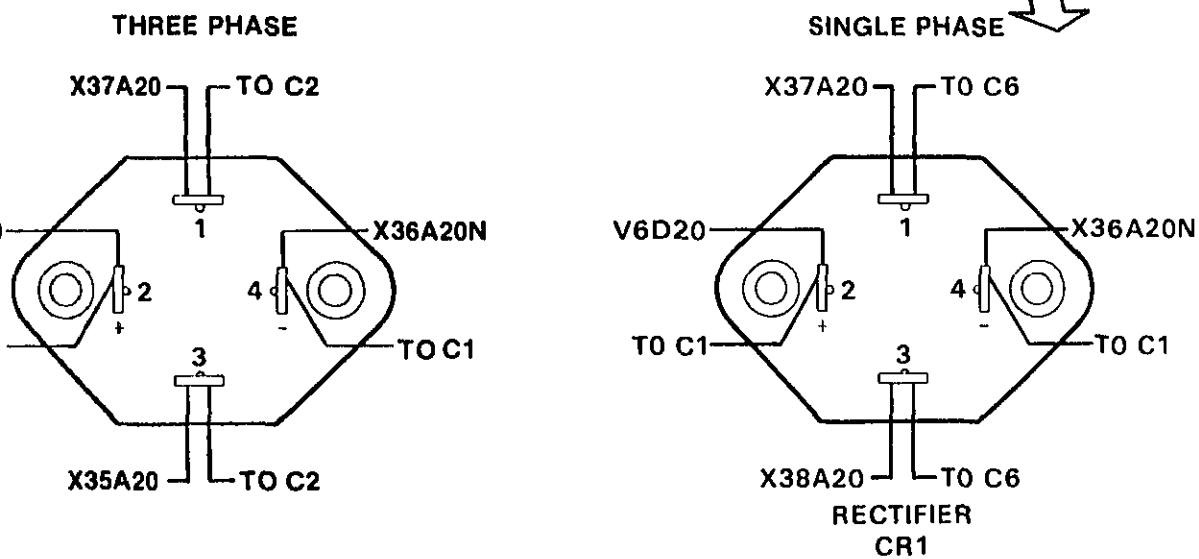
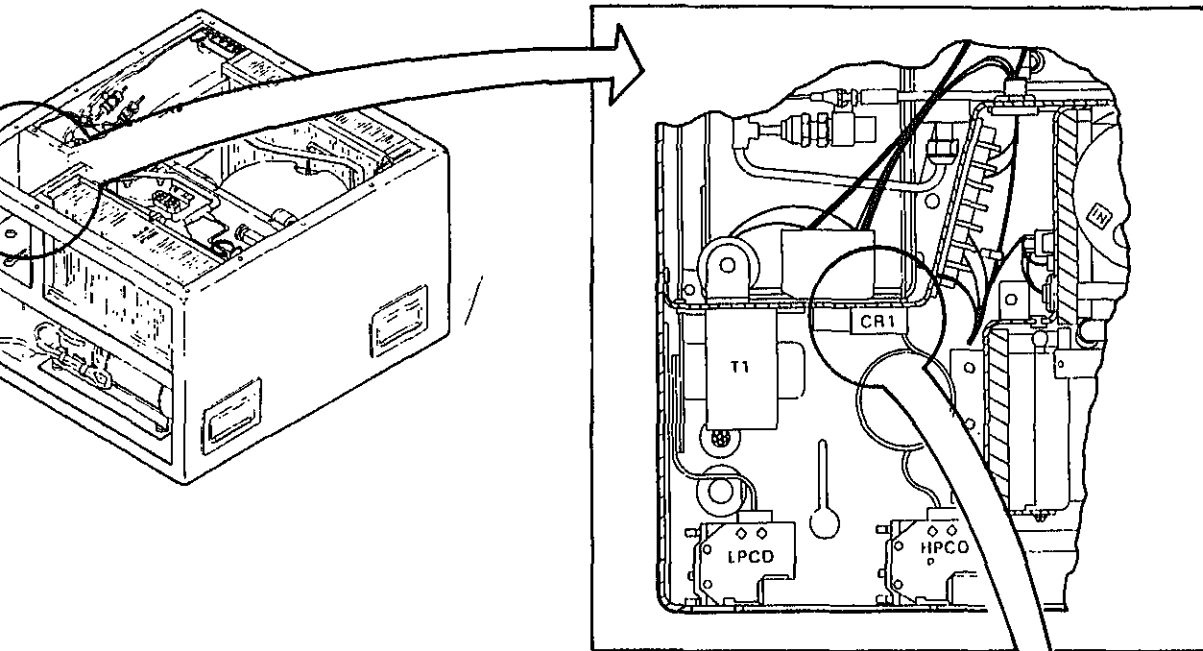
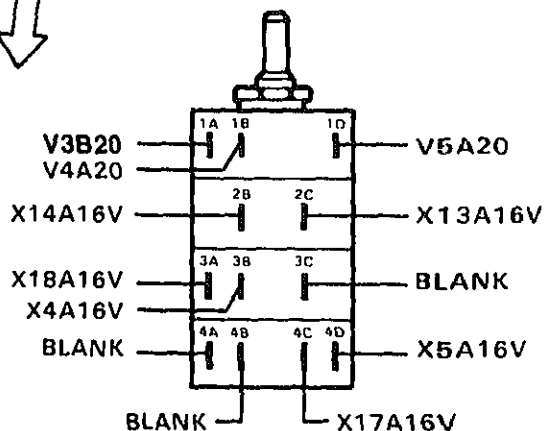
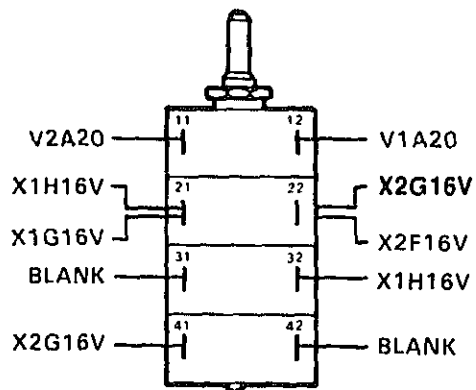
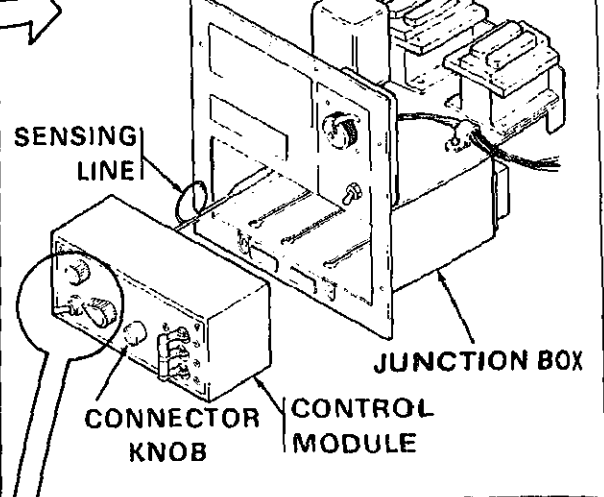
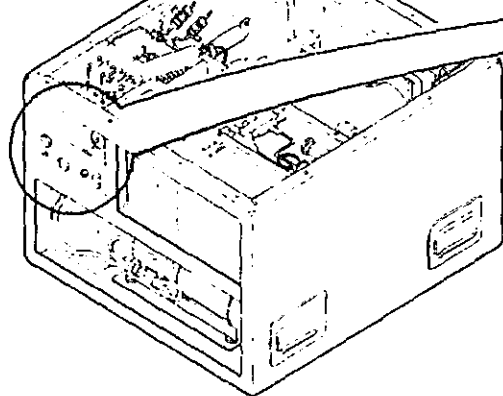
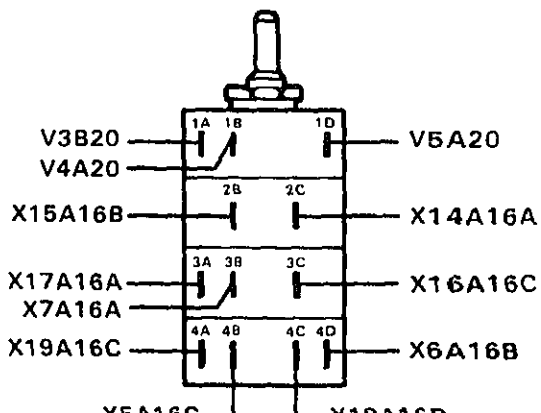
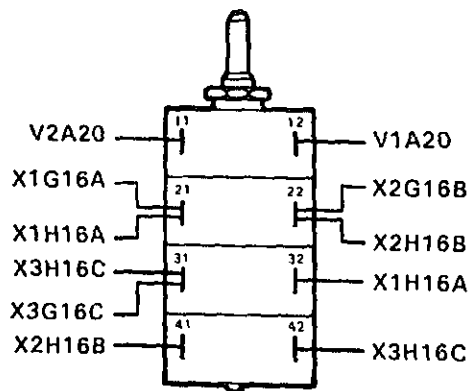


Figure 4-9. Terminal Location, Rectifier CR1



SINGLE PHASE



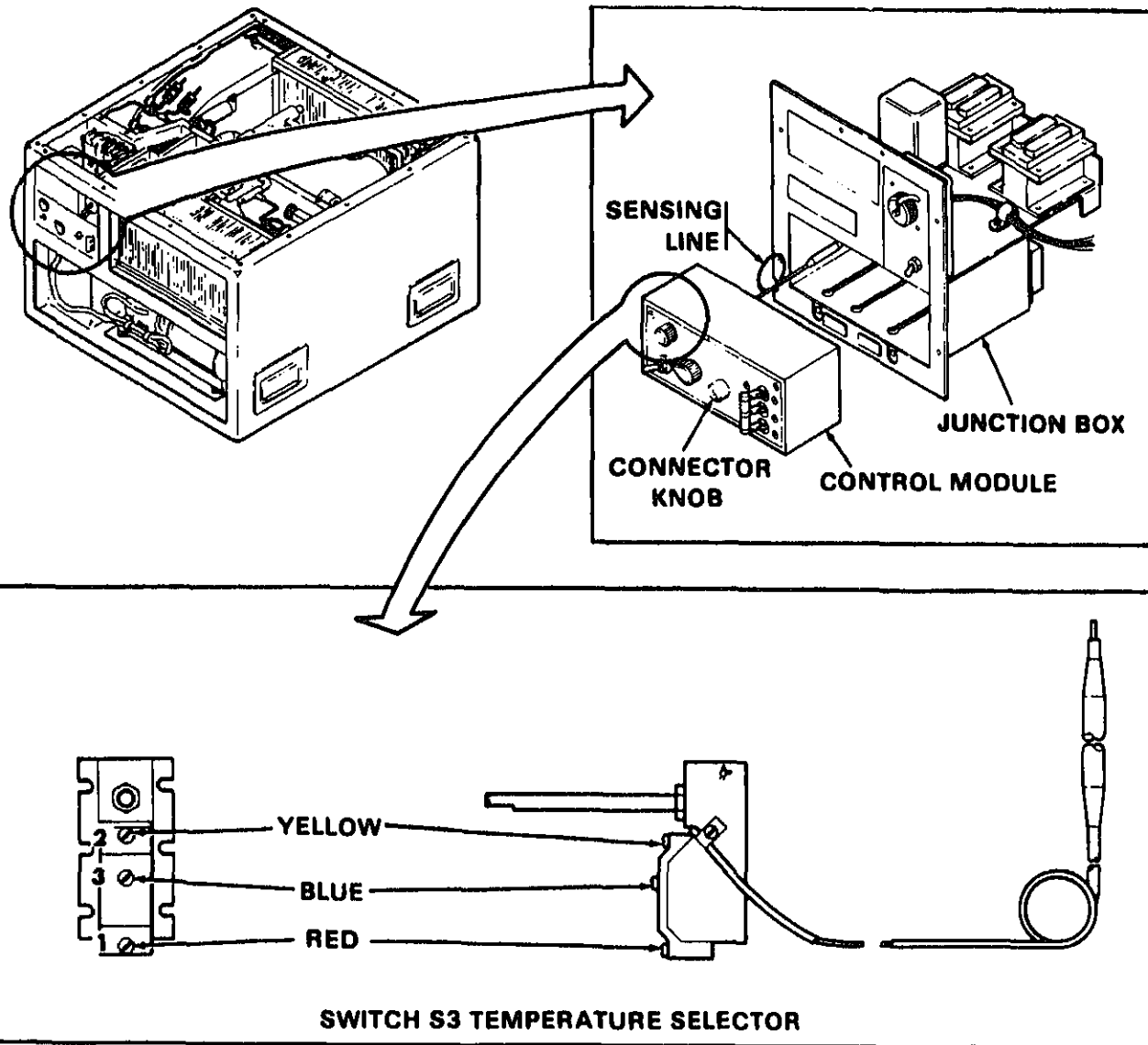
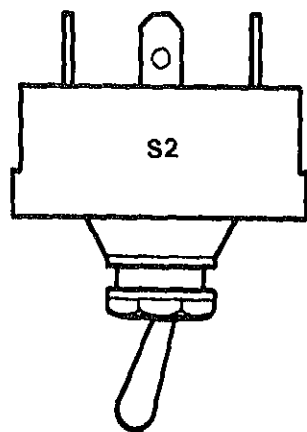
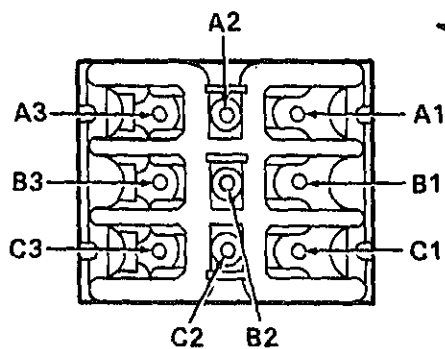
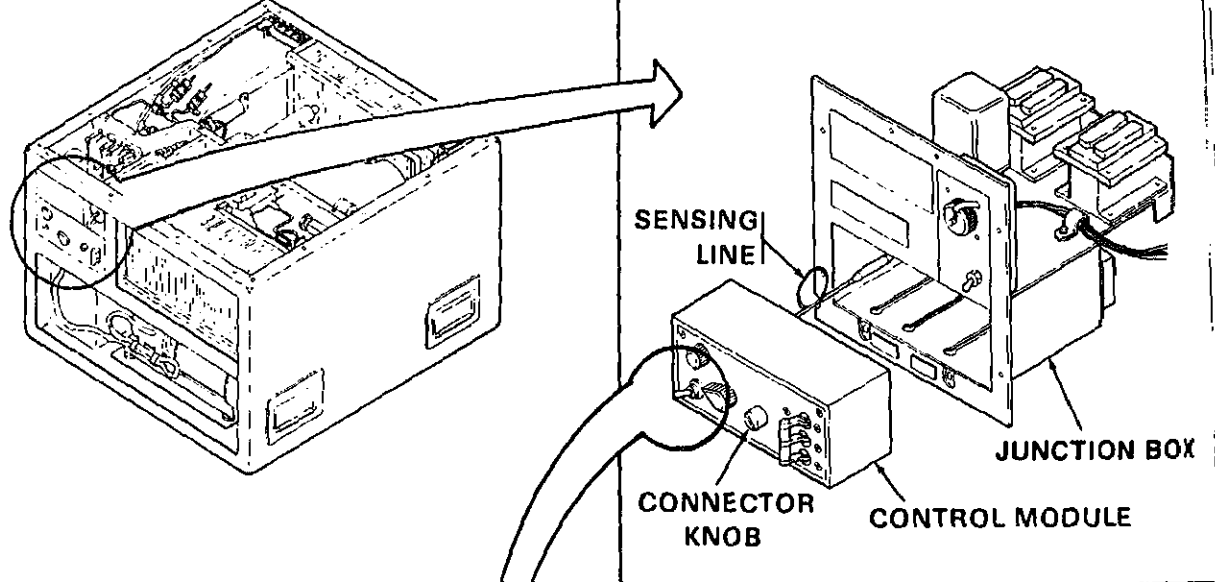
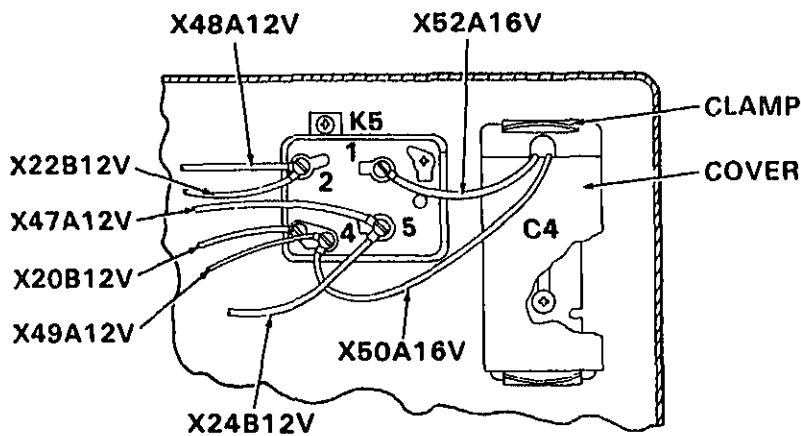
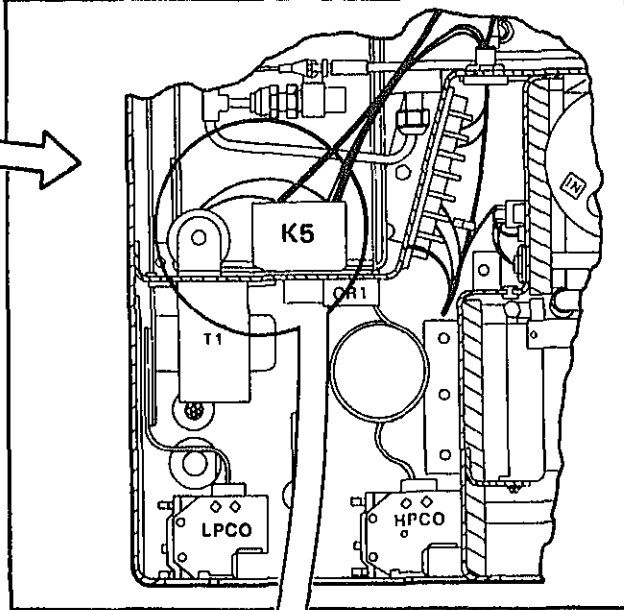
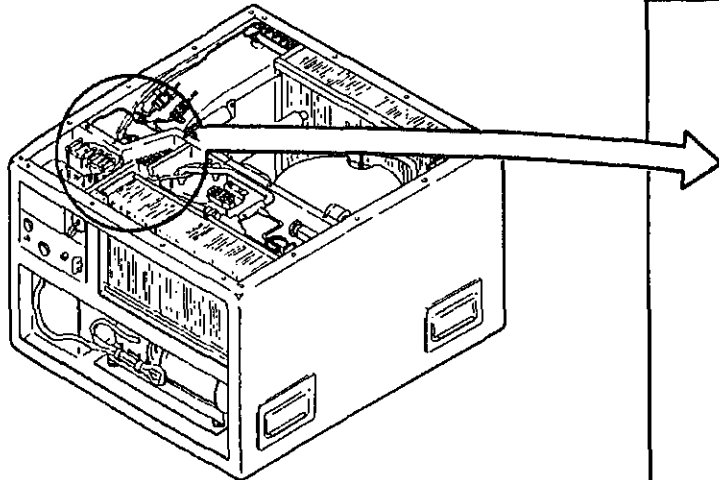
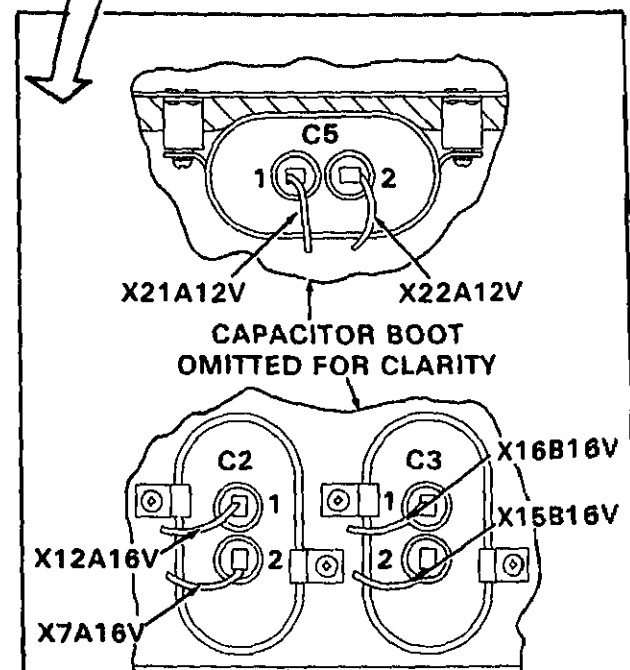
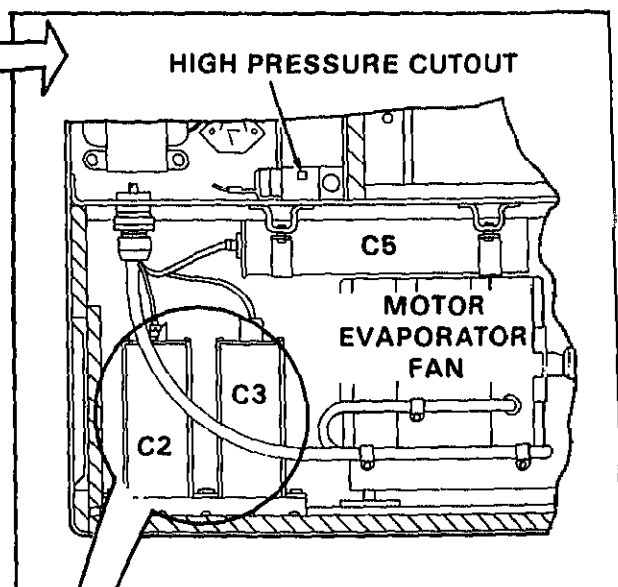
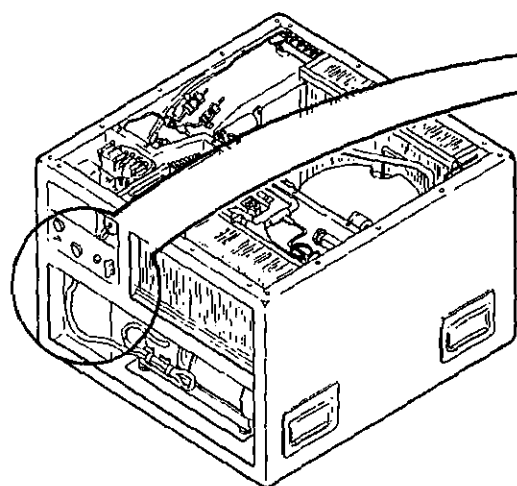


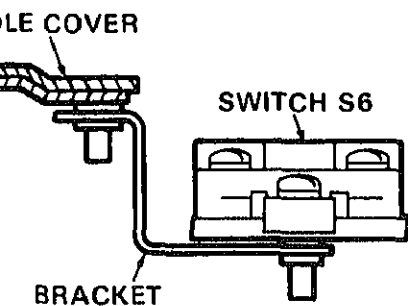
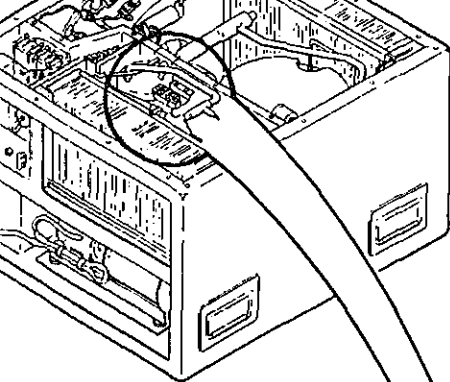
Figure 4-11. Terminal Location, Temperature Selector Switch S3



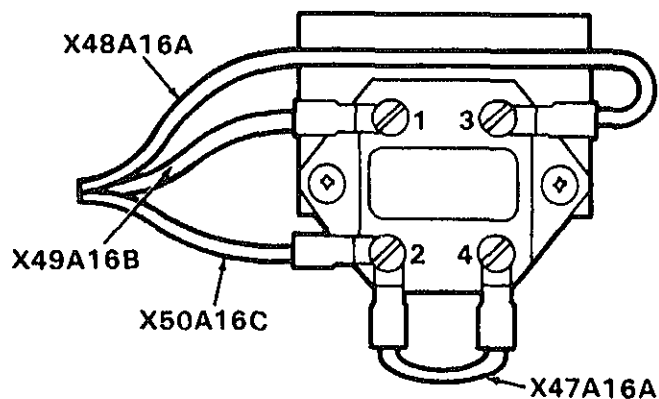


RELAY K5 AND CAPACITOR C4 SINGLE PHASE

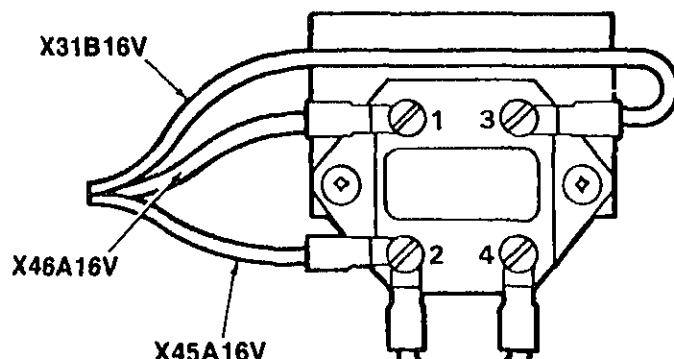




THREE PHASE



SINGLE PHASE



Position	Function	Switch Sections And Terminals Connected			
		S1A	S1B	S1C	S1D
1	Heat (HIGH)	12 and 1A	21 and 2C 22 and 2B	32 and 3A	41 and 4C
2	Heat (LOW)	12 and 1A	21 and 2C 22 and 2B	_____	_____
3	OFF	_____	_____	_____	_____
4	VENT	_____	21 and 2C 22 and 2B	_____	_____
5	COOL	12 and 1B 11 and 1D	21 and 2C 22 and 2B	32 and 3B	41 and 4D

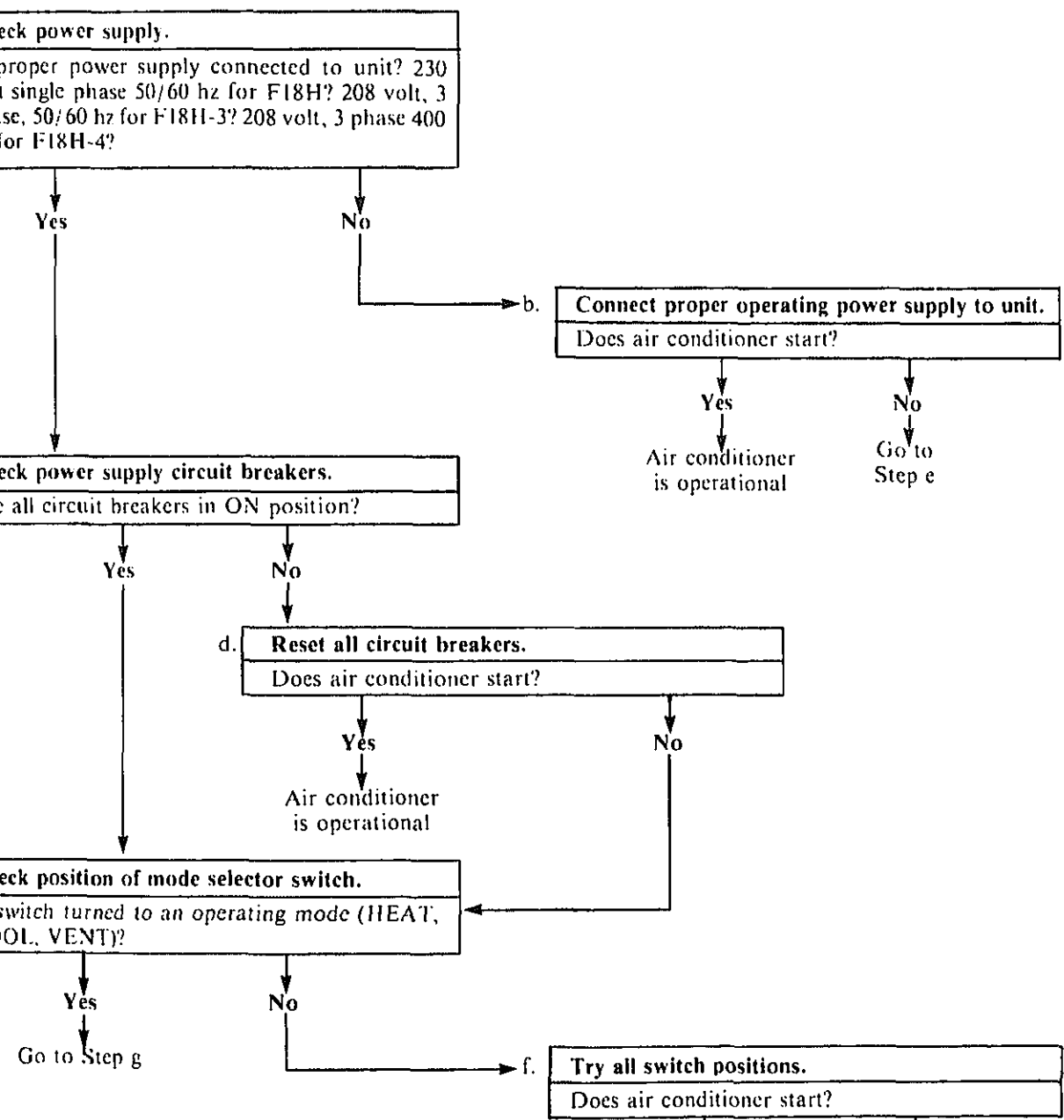
TABLE 4-5. MODELS F18H-3 AND F18H-4 MODE SWITCH POSITIONS (3 PHASE)

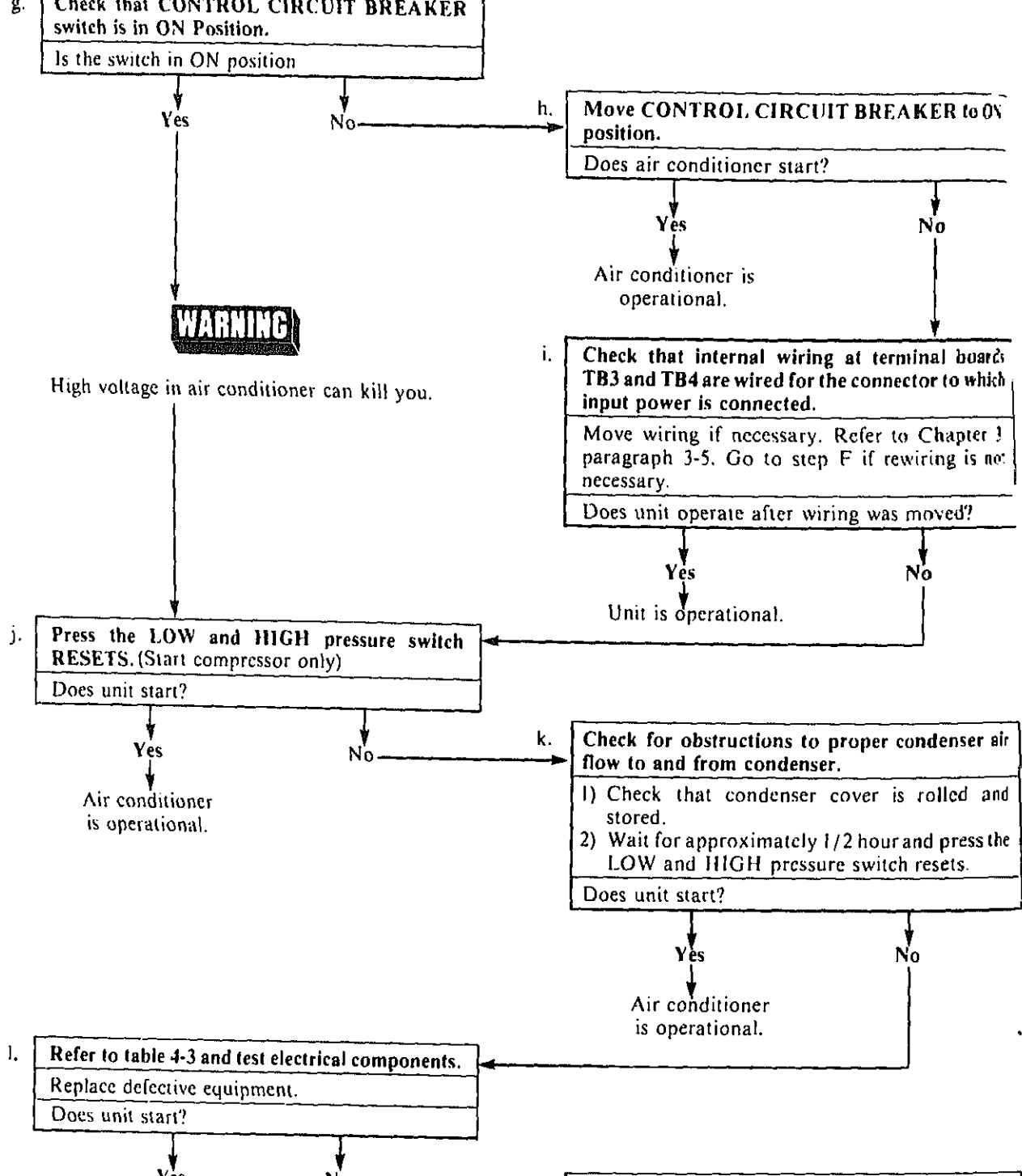
Selector Switch - S1 - Position	Switch Function	Switch Wafers And Terminals Connected			
		S1A	S1B	S1C	S1D
1	HEAT (HIGH)	12 and 1A	21 and 2C 22 and 2B	31 and 3C 32 and 3A	41 and 4C 42 and 4A
2	HEAT (LOW)	12 and 1A	21 and 2C 22 and 2B	31 and 3C	_____
3	OFF	_____	_____	_____	_____
4	VENT	_____	21 and 2C 22 and 2B	31 and 3C	_____
5	COOL	12 and 1B 11 and 1D	21 and 2C 22 and 2B	32 and 3B 31 and 3C	42 and 4B 41 and 4D



High voltage in air conditioner can kill you.

Evaporator blower will operate in one speed without the control circuit.





EVAPORATOR BLOWER FAILS TO

Indications:

Compressor starts.
Condenser fan motor starts.
Refrigerant pressure operates.
Correct power supply and phasing is applied to

WARNING

High voltage in air conditioner can kill you.

MODE SELECTOR switch to each of the positions, COOL, VENT, LOW HEAT, and HIGH HEAT.

Does blower operate in one or more of four positions of operation?

Yes

Unit is operational.

No

d.

Move MODE SELECTOR to VENT and move FAN SPEED switch back and forth between HIGH and LOW.

Does blower start when the switch is moved to HIGH or LOW?

Yes

Go to Step g.

No

Go to table 4-3 and test the switches S1 and S2.

Do components pass tests in table 4-3?

Yes

No

f.

Replace defective component.

Does blower operate after defective component is replaced? Unit is operational.

Yes

No

b. Check motor bearings.

- 1) Disconnect power cable from the air conditioner.
- 2) With the power disconnected, rotate the blower wheel by hand to see if the bearings are frozen or if shaft is bent, or if fan is loose or broken.
- 3) After inspection and repairing the blower, reconnect power cable.
- 4) If blower wheel is damaged, repair or replace. Did the repair solve the problem.

Yes

Unit is operational

No

4-4. COMPRESSOR FAILS TO START

a.

Other indications:

Condenser fan motor may or may not start.
Evaporator blower motor may or may not start.
Compressor CIRCUIT BKR is in ON position.
MODE SELECTOR set at COOL..
CONTROL CIRCUIT BREAKER set at ON.

b.

Check that PROPER power supply is connected to the unit.

Is 230 volt AC, single phase 50/60 hz connected to Model F18H; 208 volts AC, 3 phase 50/60 hz connected to Model F18H-3; 208 volt AC, 3 phase 400 hz connected to Model F18H-4?

Yes

Go to Step d.

No

c.

Connect proper operating power supply to unit

Does compressor start?

Yes

Unit is operational.

No

d.

Check phase rotation on Models F18H-3 and F18H-4.

For Model F18H go to step E. Is phase rotation correct?

Yes

Go to Step e.

No

e.

Press the LOW and HIGH pressure switch RESETS.

Does unit start?

Yes

Unit is operational.

No

f.

Refer to the unit wiring diagram and trace out wiring.

Check for broken and loose connections.

g.

Check for obstructions to proper air flow to and from condenser.

1) Check that condenser cover is rolled and stored.

WARNING

High voltage in air conditioner can kill you.

WARNING

4-5. CONDENSER FAN FAILS TO START

Other indications:

Evaporator blower motor may or may not start.
Compressor CIRCUIT BKR is in ON position.
MODE SELECTOR set at COOL.
CONTROL CIRCUIT BREAKER set at ON.

→ b.

WARNING

High voltage in air conditioner can kill you.

Check bearings.

- 1) Disconnect power cable from the air conditioner.
- 2) With the power disconnected, rotate fan by hand to see if the fan is binding or loose on motor shaft.
- 3) Check to see if fan is rubbing and/or sticking against the fan inlet.
- 4) Repair as necessary.
- 5) Reconnect power cable.

Did this repair solve the problem

Yes

Unit is operational.

No

Check Selector Switch

Connect power cable and move MODE SELECTOR switch to COOL.

Does compressor and evaporator blower operate?

Yes

No

Refer to paragraph 4-4 steps b thru e.

→ d.

Test the motor.

Is motor defective?

Yes

Replace motor

No

Refer to table 4-3 and test switch S1 and Relay K4.

Is switch or relay defective?

4-6. LITTLE OR NO COOLING ACTION

a.

Other indications:

Evaporator blower operating.
Condenser blower operating.
Compressor operating.

b.

Check control settings.

- 1) Turn mode selector switch to COOL.
- 2) Turn temperature control to maximum COOLER.

Is normal cooling established after 15 minutes operation?

Yes

No

Air conditioner is operational.

NOTE

If fresh air duct or return air ducts are blocked, smaller volume of air discharged will be very cool.

c.

Check Air Movement.

- 1) Remove power.
- 2) Remove air filters, clean and replace (paragraph 5-19)
- 3) Remove any obstruction to airflow.
- 4) Check mist eliminator (paragraph 5-20).
- 5) Apply Power.

Is normal air movement felt?

Yes

No

d.

Check Evaporator Coil

Remove louver and mist eliminator

Is there any frost on coil?

Yes

No

Go to paragraph 4-13

e.

Check Openings In Shelter.

- 1) Remove power.
- 2) Inspect shelter for openings that allow air to move into or out of the shelter.

Are openings properly closed?

Yes

No

Close openings.

f.

Check Air Intake.

Inspect area near fresh air duct and condenser guard for source of heat over 120° F (40° C).

WARNING

High voltage in air conditioner can kill you.

WARNING

High voltage in air conditioner can kill you.

Is cooling action effective?

Yes

Air conditioner is operational.

No → h.

Check Refrigerant.

- 1) Operate air conditioner for 15 minutes with temperature control in maximum COOLER position.
- 2) Inspect liquid in sight glass (on back of condenser section).

Is liquid clear and bubble-free?

No

Yes

Use leak detector to find refrigerant leak. (paragraph 6-2).

- 1) Repair or change defective part or repair leak.
- 2) Charge system with refrigerant (Paragraph 6-6 or 6-7.
- 3) Operate air conditioner for 15 minutes with temperature control in maximum COOLER position.

Is cooling action effective?

Yes

Air conditioner is operational

No

Check Liquid Line Solenoid Valve L2 Coil.

- 1) Remove power.
- 2) Remove top cover, condenser.
- 3) Disconnect leads from valve coil L2.
- 4) Measure resistance of coil L2.

Is coil resistance 25 to 50 ohms?

Yes

Connect Leads

No

Change solenoid valve L2 coil.

- 1) Connect leads to new coil.
- 2) Apply Power.
- 3) Operate in COOL mode with maximum COOLER temperature setting.

Is cooling action effective?

Yes

No

WARNING

High voltage in air conditioner can kill you.

j.

Check Refrigerant System.

- 1) Measure ambient outside temperature.
- 2) Operate air conditioner in COOL mode with maximum COOLER temperature setting for at least 15 minutes.
- 3) Measure condenser discharge air temperature which should be 30 to 40°F (-1 to 4°C) above ambient.
- 4) Measure temperatures of air going into (return) and out of (discharge) evaporator section.
- 5) Discharge should be 15 to 25°F (-10 to -4°C) lower than return air temperature.

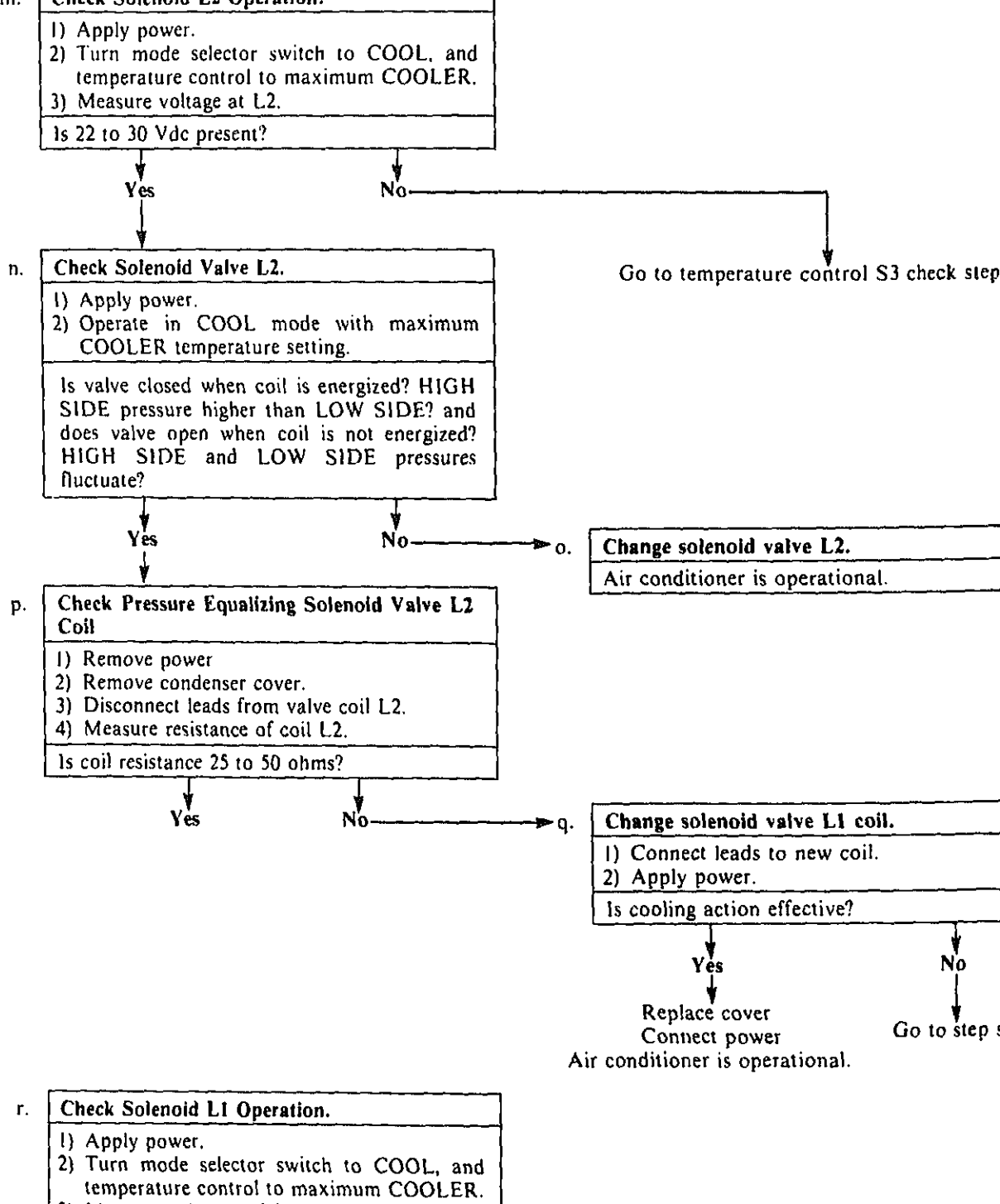
Are temperatures within tolerances?

Yes

Air conditioner is operational.

No

Go to Step k.



Check Solenoid Valve L1

Apply power.

Operate in COOL mode with maximum COOLER temperature setting.

Is valve closed when coil is energized? (HIGH SIDE pressure higher than LOW SIDE pressure?) and does valve open when coil is not energized? (HIGH SIDE and LOW SIDE pressures equalized?)

Yes

Change solenoid valve L1.

Air conditioner is operational

No

t. Check Evaporator Expansion Valve L1.

- 1) Remove power.
- 2) Remove top cover, evaporator.
- 3) Apply power.
- 4) Operate in COOL mode with temperature control at maximum COOLER.

Does expansion valve outlet line feel cold?

Yes

Air conditioner is operational.

No

Check Expansion Valve Sensing Action.

Remove thermal bulb.

Hold thermal bulb firmly in both hands for 3 or 4 minutes.

If inlet line starts to cool, replace thermal bulb and straps.

If inlet line does not cool, replace expansion valve.

Is cooling action effective?

Yes

Replace covers.

Air conditioner is operational.

No

v.

Check Expansion Valve Superheat.

- 1) If valve does not provide 5.5 to 6.5°F (-14.7 to -14.1°C) superheat, change expansion valve.
- 2) Replace covers.

Air conditioner is operational.

From steps m and r

Check Temperature Control S3.

Apply power.

Set mode selector switch to COOL.

Set temperature control to maximum COOLER position.

Check for output voltage.

Is voltage 25 to 31 Vdc present?

x.

Check Mode Selector Switch.

**AIR COOLING ACTION STOPS AFTER
OPERATING FOR SHORT TIME**

WARNING

High Voltage in Air Conditioner Can Kill You!

- a. **Other Indications:**
Compressor motor stops.
Condenser blower motor stops.

- b. **Check condenser cover.**
Is cover rolled up and tied?

Yes

No

NOTE

Compressor may have stopped due to compressor thermal overload.

- c. **Roll up cover and tie securely.**
1) Manually reset high pressure switch.
2) Operate in COOL mode with temperature control at maximum COOL.
Does cooling action continue without interruption?

Yes

No

Air conditioner is operational

- d. **Check for heat source close to air intake.**
Check for blocked condenser.
Correct deficiencies.
Does air conditioner operate normally?

Yes

No

Air conditioner is operational.

- e. **Use wiring diagram to check for loose or broken cables, connectors, and wiring.**

4-8. LITTLE OR NO HEATING IN LOW HEAT MODE

a.

Other indications:

Evaporator blower is operating.
Proper power supply is supplied and properly connected to unit.

WARNING

High Voltage in Air Conditioner Can Kill You!

NOTE

This unit can operate in temperatures as low as -50°F (-45.5°C). However, depending on shelter size, shelter heat loss, and amount of heat generated by equipment in the shelter, heat output low heat mode may or may not heat shelter to a comfortable level.

b. Check air movement in evaporator section.

- 1) Apply power.
- 2) Set mode selector switch to LOW HEAT.
- 3) Turn temperature control to maximum WARMER position.
- 4) Feel air ducts for air movement in and out of air conditioner.

Is air moving into return air filter and out discharge opening?

Yes

No

c. Check reason for low air flow.

- 1) Turn mode selector switch to OFF.
- 2) Remove return air filter, clean and replace (Paragraph 5-19)
- 3) Remove any obstruction to air flow.
- 4) Check mist eliminator (Paragraph 5-20).

Is heating action effective?

Yes

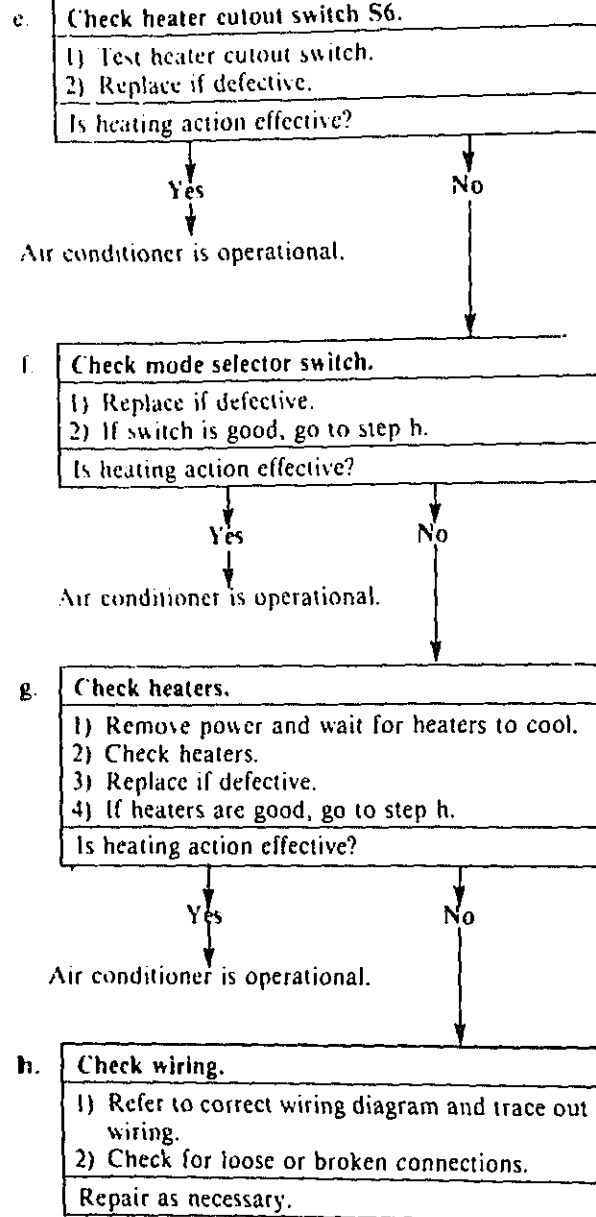
No

Air Conditioner is operational.

d.

Compare discharge air temperature to return air temperature.

- 1) Turn mode selector switch to LOW HEAT and temperature control to maximum WARMER.
- 2) After operating for five minutes, measure



**4-9. LITTLE OR NO ADDITIONAL
HEATING IN HIGH HEAT.**

a.

Other indications:

Evaporator blower is operating.
Proper power supply is supplied and properly
connected to unit.
Controls are set for **HIGH HEAT**.

b.

**Check that TEMPERATURE SELECTOR is set
to the extreme WARMER position (clockwise as
far as it will go).**

Move to maximum WARMER. After operating
for five minutes, check air temperature.

Is heating action effective?

Yes

No

High voltage in air conditioner can kill you.

NOTE

This unit can operate in temperatures as low
as -50°F (-45.5°C). However, depending on
excessive shelter heat loss, and extremely low
amount of heat generated by equipment in the
shelter, heat output may or may not heat
shelter to a comfortable level.

Air conditioner is operational.

c.

Check openings in shelter.

- 1) Inspect shelter for openings that allow cold air
to move into the shelter.
- 2) Seal all openings.

Are openings properly closed? Is heating action
effective?

Yes

No

Air conditioner is operational.

d.

**Check air movement into and out of the air
conditioner.**

- 1) Check air filter.
- 2) Clean the filter.
- 3) Check for and remove obstructions to free air
flow.

Is heating action effective?

Yes

No

Air conditioner

f. **Check MODE SELECTOR switch S1.**

- 1) Replace if defective.
- 2) If switch is good go to step f.

Is heating action effective?

Yes

Air conditioner is operational

No

g. **Check RELAY K2.**

- 1) If defective replace.
- 2) After operating for five minutes, check air temperature.

Is heating action effective?

Yes

Air conditioner is operational

No

h. **Test heaters.**

- 1) Remove power and wait for heaters to cool.
- 2) Replace if defective.
- 3) If heaters are good, go to step h.

Is heating action effective?

Yes

Air conditioner is operational.

No

i. **Check wiring.**

- 1) Refer to correct wiring diagram
- 2) Trace out wiring.
- 3) Check for loose or broken connections.

Repair as necessary.

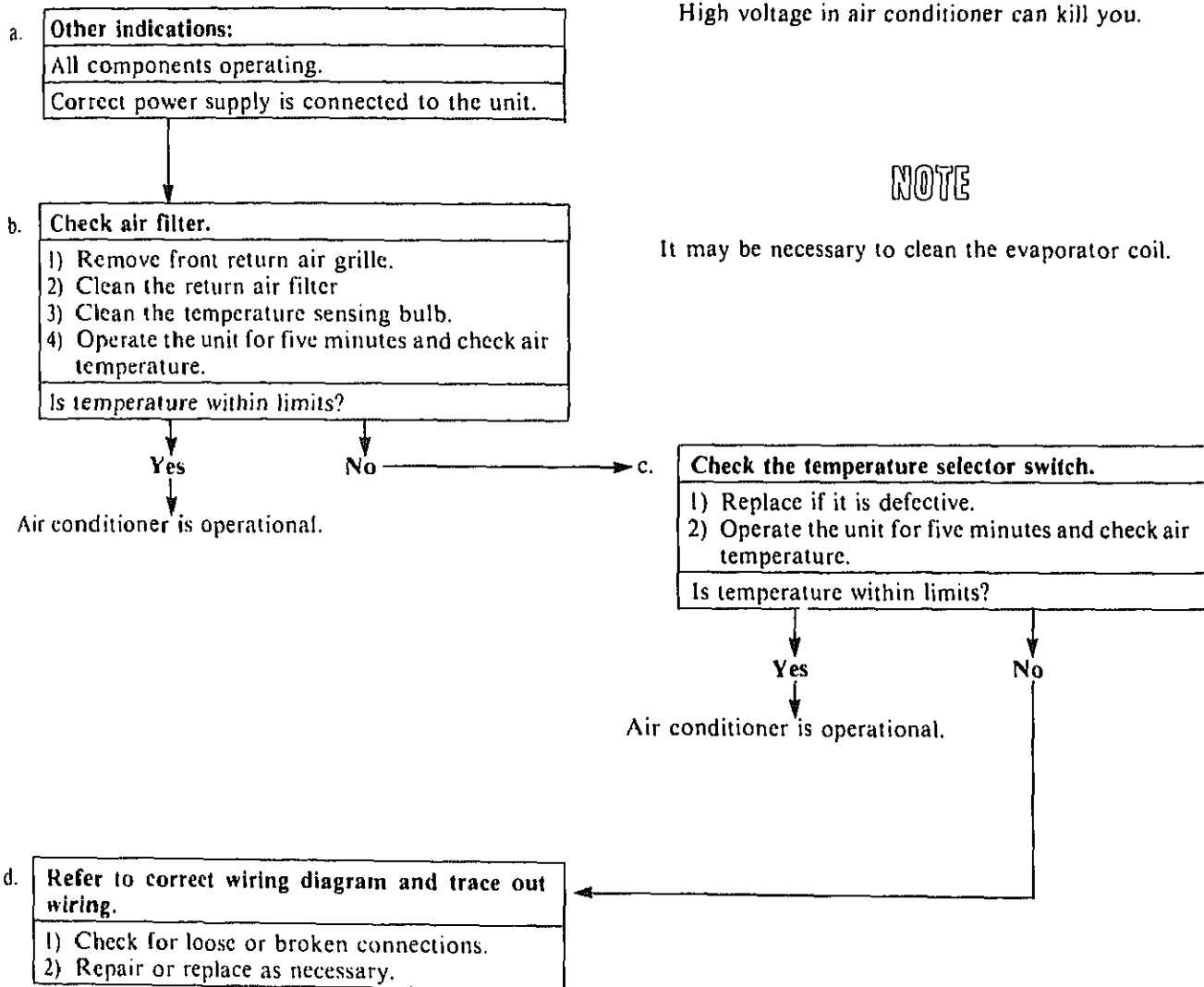
4-10. TEMPERATURE SELECTOR NOT EFFECTIVE

WARNING

High voltage in air conditioner can kill you.

NOTE

It may be necessary to clean the evaporator coil.



NOTE

Due to weather extremes and shelter heating/cooling loads it may require a longer time period to bring shelter temperature to

a. **Check air conditioner installation.**
Examine air conditioner mounting hardware and brackets.
Are brackets undamaged and firmly attached?

Yes

No

b.

Replace or tighten loose components.

- 1) Remove power.
- 2) Tighten loose screws.
- 3) Install missing screws.
- 4) Repair or replace defective bracket.
- 5) Apply power.

Has noise and vibration stopped?

Yes

No

Air conditioner is operational.

c.

Check Air Conditioner Housing.

- 1) Remove power.
- 2) Examine fresh air duct, all covers, and attaching hardware.

Are air ducts and covers undamaged and firmly attached to housing?

Yes

No

d.

Tighten loose screws.

- 1) Install missing screws.
- 2) Repair or change defective ducts and covers.
- 3) Apply power.

Has noise and vibration stopped?

Yes

No

Air conditioner is operational.

NOTE

Perform following check only if noise is present in both COOL and HEAT modes. If noise only in cool go to the condenser section check.

e.

Check evaporator section.

- 1) Remove power.
- 2) Remove top cover, evaporator.
- 3) Examine all parts and attaching hardware.
- 4) Check blower impeller for interference or being out of round.

Are parts firmly attached? Does impeller spin freely without wobble?

Tighten loose screws.

Install missing screws, clamps, and brackets.
Adjust position of impellers until they spin freely.
Change damaged parts.
Apply power.

Has noise and vibration stopped?

Yes

Replace covers.
Air conditioner is operational.

No

g.

Check condenser section.

- 1) Remove Power.
- 2) Remove condenser top cover.
- 3) Check fan for interference or out of round.

Does fan spin freely without wobble?

Yes

No

h.

Check fan for out of balance or check motor shaft bearings.

- 1) Replace fan
- 2) Replace motor bearings.

Yes

Air conditioner is operational.

No

Check compressor mounting.

Grasp compressor and shake and rock.

Are there unusual noises or movements?

Yes

Loosen or tighten compressor mounting hardware.

No

j.

Check for loose parts and/or components.

Visually check for loose parts, or missing hardware.

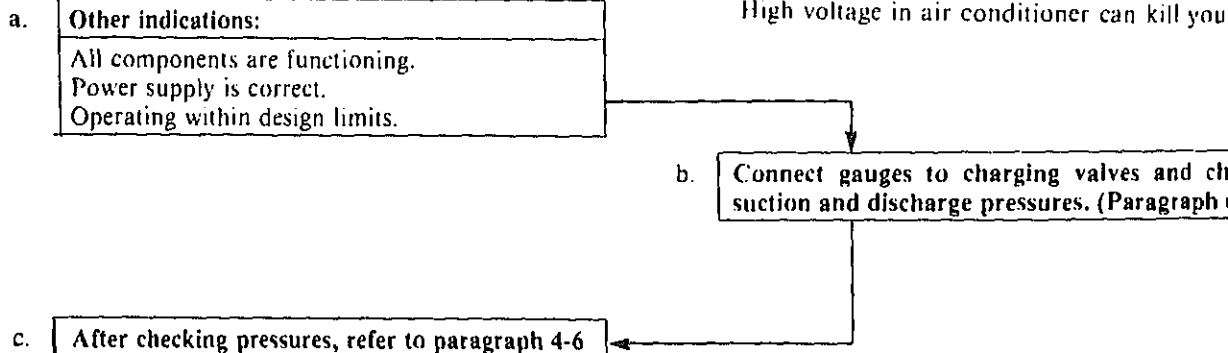
Physically check piping for movement.

Unit is operational

4-12. UNIT RUNS, BUT DISCHARGE AIR IS WARM

WARNING

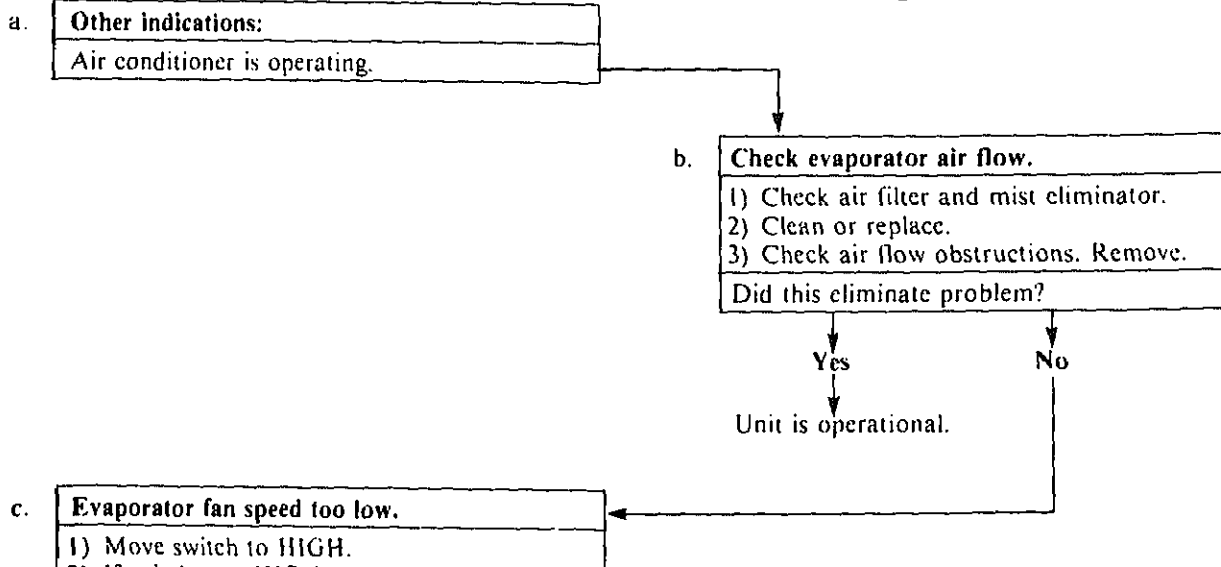
High voltage in air conditioner can kill you.



4-13. Frosted Evaporator Coil

NOTE

Stop operation and allow frost to melt before troubleshooting.



EXCESSIVE HEAD PRESSURE.

Other indications:

Unit stopped by high pressure cutout.

b.

Restricted condenser air.

1) Remove obstruction.

2) Is head pressure normal?

Yes

No

Unit is operational.

Refrigerant in system.

Purge air.

Charge system.

Is head pressure normal?

Yes

No

Unit is operational.

d.

Check condenser fan, condenser louver and actuating cylinder.

Repair as necessary.

LOW HEAD PRESSURE

Other indications.

Little or no cooling.

Defrosted evaporator coil.

b.

Low refrigerant charge.

Add refrigerant.

Is pressure normal?

Yes

No

Unit is operational.

Refrigerant leak.

Repair.

High head pressure

b.

Same conditions as for excessive head pressure paragraph 4-14.

4-17. LOW SUCTION PRESSURE

a.

Other indications:

Unit stops on low pressure cutout.

Frosted evaporator coil.

b.

Outside air temperature below 0°F (-18°C) jumper LPCO.

Is pressure normal?

Yes

Unit is operational.

No

c.

Low refrigerant charge.

Leak test, repair, and add refrigerant.

Is pressure normal?

Yes

Unit is operational.

No

d.

Check evaporator air flow. (4-3).

1) Check air filter

2) Check mist eliminator.

Repair or replace.

Yes

Unit is operational

No

e.

Solenoid valve L2 not closing.

CHAPTER 5

ORGANIZATIONAL MAINTENANCE

GENERAL MAINTENANCE PROCEDURES.

Work covers:

Removal

Testing

Inspection

Splicing Wires

Crimping terminals

Insulating joints

Soldering connections

SETUP

Table Configurations

Special Environmental Condition

None

General Safety Instructions

Equipment

See WARNING page

meter

References

Tools

None

9

Troubleshooting References

Materials/Parts

None

Shrink tubing

Personnel Required

er

ent PD680

Organizational Maintenance

rgent

ning Cloths

ment Descriptions

er OFF

... by individual wire leads or by wire leads laced or enclosed in "Ty-raps" to form a wiring harness.

- b. All of the wiring carries code numbers.
- c. When repairing, or replacing the wiring harness or individual wires, refer to the wiring diagrams. FO-1, FO-3, FO-5, or FO-6.1.

WARNING

Disconnect air conditioner power supply before performing maintenance work on electrical system.

- d. Preferred repair methods consist of replacing wires, terminals, connectors, etc. rather than splicing wires, bending ends to form terminals, and other makeshift procedures.

- e. Determine the proper size and length of wire, terminal or connector to be used for replacement.

TESTING

- a. Use a multimeter set on low ohms range to test for continuity.
- b. Use multimeter set on high ohm range to test for shorts between the circuit in a component and the outside case of the component.
- c. When testing electrical component, also look for visual damage and inspect all wiring in the area for damage or loose connections.
- d. Test for continuity in leads or wiring harnesses by disconnecting each end.
- e. Where wires terminate in an electrical connector, disconnect connector from corresponding receptacle connector or plug connector.

- f. Touch the test probes of a multimeter set on low ohms range to the terminals of the connector.

CATION/ITEM	ACTION	REMARKS
CTION	<ul style="list-style-type: none"> a. Inspect all wiring installations for cracked or frayed insulation material. . . . b. Pay particular attention to wires passing through holes in the frame or around sharp edges. . . . c. Repair or replace defective wiring. . . . d. Inspect electrical connectors and fittings for damage or broken conditions. . . . e. Replace defective connectors and fittings. . . . 	
ING WIRES	<ul style="list-style-type: none"> a. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced. . . . b. A commercial butt splice can be crimped onto the ends to join them, or a wire splice can be made. . . . c. A wire splice is made by stripping one 1-¼ inch of insulation from the wire ends, holding the ends parallel and facing opposite directions, then twisting each end around the other wire at least three turns. . . . d. Solder and apply insulation. . . . 	
ING TERMINALS	<ul style="list-style-type: none"> a. To install a terminal on end of a wire, strip ¼ - ½ inch of insulation from the end of the wire. . . . b. Apply a one-inch piece of heat-shrink tubing (if the terminals are of the uninsulated type), and insert wire-end into the shank of the terminal. . . . c. Crimp the shank. . . . d. Install heat-shrink tubing if necessary. . . . 	
ATING JOINTS	<ul style="list-style-type: none"> a. The preferred method of insulating 	

LOCATION/ITEM

ACTION

REMARKS

INSULATING JOINTS

- c. Slide the tubing over the wire before making the joint. . . .
- d. After the joint is made, slide the tubing over the joint and shrink in place with moderate heat. . . .

SOLDERING CONNECTIONS

- a. Wire connections must be made mechanically sound before they are soldered. . . .
- b. Solder alone does not provide sufficient strength to prevent breakage. . . .
- c. Joining surfaces of connections to be soldered must be clean and bright. . . .
- d. If a separate flux is used, it should conform to Specification MIL-F-4995, Type I, rosin-alcohol flux, and should be brushed onto the joint before soldering. . . .
- e. If a flux-core solder is used, it should always be rosin-core electrical solder. . . .
- f. If an uncured solder is used it should be a lead-tin solder conforming to Specification QQ-S-571. . . .
- g. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. . . .
- h. Excessive build-up of solder "gobs" on the joint should be avoided or removed. . . .
- a. Refer to table 5-1. . . .

PREVENTIVE MAINTENANCE CHECKS

Table 3-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-Quarterly (250 Hours)

Interval	Item to be Inspected	Procedures
Q		
●	Air Filters	Check that filters are clean.
●	Mist Eliminator	Check that eliminator is clean.
●	Evaporator Coil	Check that coil is clean.
●	Condenser Coil	Check that coil is clean.
●	Evaporator Motor	Check that motor is clean. Turn shaft to be sure bearings are not defective.
●	Condenser Motor	Check that motor is clean. Turn shaft to be sure bearings are not defective.
●	Air Conditioner Unit	Lubricate all movable connections and linkage with SAE 20 oil. Check for loose, missing, or damaged components.

ADDITIONAL RADIO INTERFERENCE SUPPRESSION.

What it covers:

General Information

SETUP

Available Configurations

Equipment

Tools

Materials/Parts

Component Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
GENERAL	a. Essentially suppression is attained by providing a low resistance path to ground for the stray currents. Methods used include grounding the frame with banding straps and using capacitors and resistors.	. . .
	b. The control module, junction box and electrical system components are grounded to the housing.	. . .
	c. The housing is connected to a ground wire in the power supply.	. . .
	d. Capacitors are located across the rectifier terminals.	. . .
	e. Grommets are inserted in the heat support bracket to isolate heating elements from bracket to prevent metal to metal contact and scraping during expansion and contraction of heating elements.	. . .
	f. Power inlet cover chains are encased in shrinktype tubing to prevent rattling of chain links.	. . .

5-3. EMI CAPACITORS C2 AND C1

This task covers:

a. Removal

SETUP

able Configurations

quipment

imeter

l Tools

e

als/Parts

t-shrink tubing

er

air dryer

ment Descriptions

er OFF

alled in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM

ACTION

REMARKS

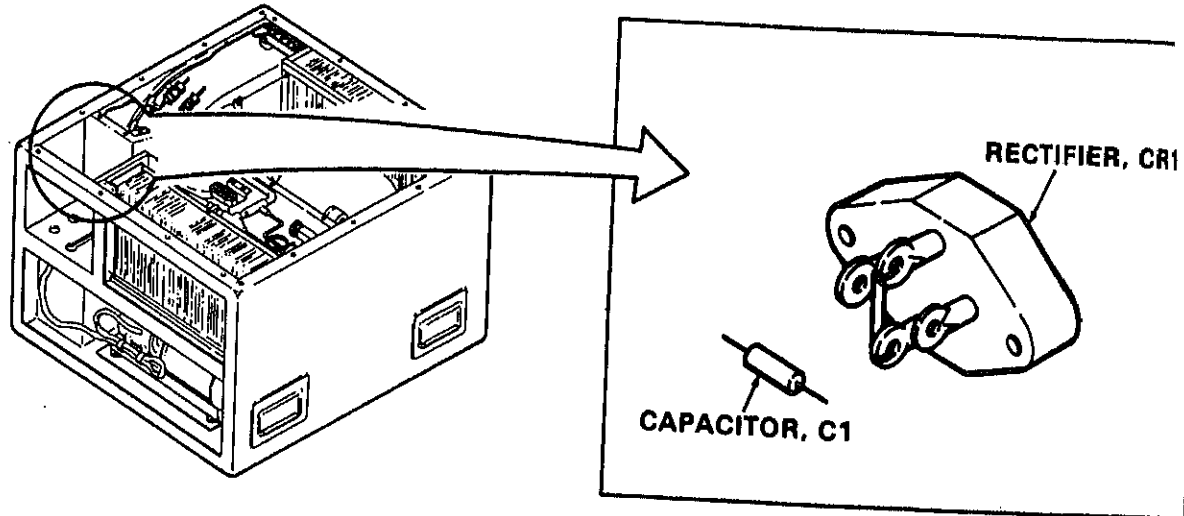
ACITOR CI
MOVAL

- Disconnect power supply.
- Remove evaporator section top cover.
- Remove screws and pull junction box from frame. Use care to avoid breaking the sensing line.
- Tag and pull "quick disconnect" terminals from rectifier CR1 terminals 2

WARNING

High voltage can kill.

Sensing line connects
TEMPERATURE SELECTOR
to sensing bulb which is located
behind return air louver.



AC1111

TMB-4120-387-111

Figure 5-1. Capacitor C1

LOCATION/ITEM

ACTION

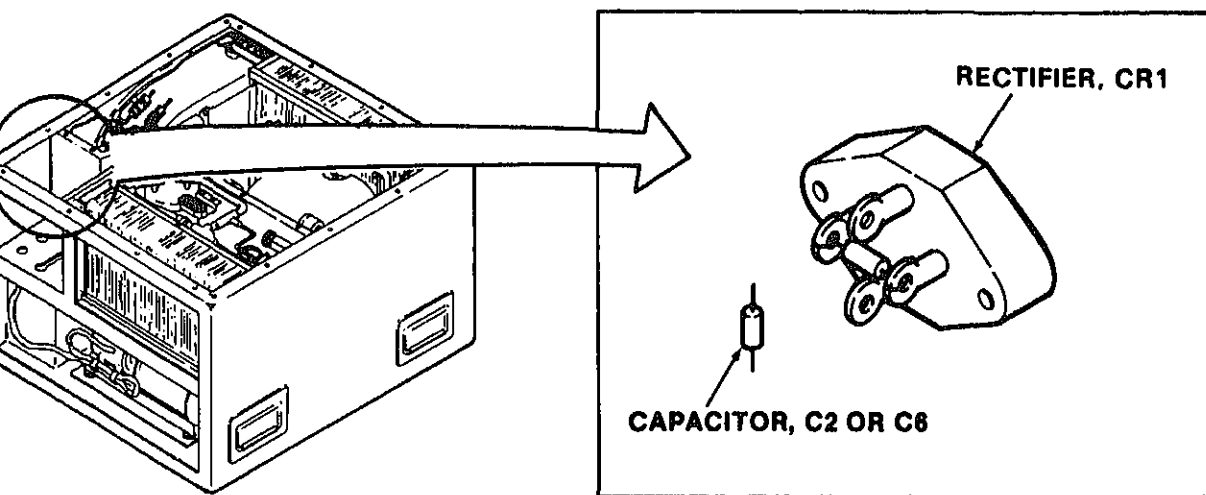
REMARKS

INSTALLATION

- a. Slip heat shrink tubing over capacitor leads and leads X36A20N and V6D20. FO-1, FO-3, FO-5, or FO-8.
- b. Join one capacitor lead and wire V6D20. . . .
- c. Join second capacitor lead and wire X36A20N. . . .
- d. Solder "quick disconnect" terminals to the wires. . . .
- e. Heat shrink tubing over the solder joint. Use hot air dryer.
- f. Push terminals onto rectifier CR1 terminals 2 and 4. Wire V6D20 to terminal 2; X36A20N to terminal 4.
- g. Replace junction box. . . .
- h. Replace top cover. . . .
- i. Connect power supply. . . .

5-3. CAPACITOR C2 (THREE PHASE UNITS) C6 (SINGLE PHASE UNIT)

WARNING



A01264
TMB-4120-367-14-2

Figure 5-2. Capacitor C2 (Three Phase Units) C6 (Single Phase Unit)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	d. Tag and pull "quick disconnect" terminals from rectifier CR1 terminals 1 and 3.	. . .
	e. Cut leads at terminals.	. . .
INSTALLATION	a. Slip heat shrink tubing over capacitor leads and leads X38A20N and X37A20.	FO-1, FO-3, FO-5, or FO-6.1 ■
	b. Join one capacitor lead and wire X38A20.	. . .
	c. Join second capacitor lead and wire X37A20.	. . .
	d. Solder "quick disconnect" terminals to the wires.	. . .
	e. Heat shrink tubing over the solder joint.	Use hot air dryer.
	f. Push terminals onto rectifier CR1 terminals 1 and 3.	Wire X38A20 to terminal 3; X37A20 to terminal 1.
	g. Replace junction box.	. . .

5-4. RESISTORS R1

This task covers:

- a Removal
- b Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Ty-rop
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialists

LOCATION/ITEM

ACTION

REMARKS

RESISTOR R1

REMOVAL

a. Disconnect power supply from unit.

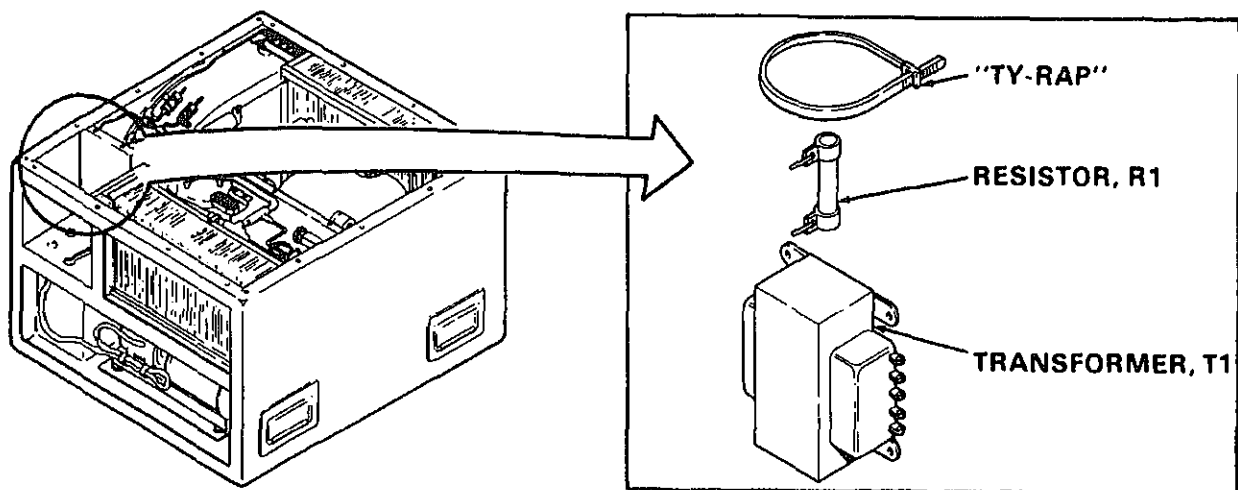
b. Remove top cover from evaporator section.

c. Remove screws and carefully pull junction box from frame. Use care to avoid breaking sensing line.

WARNING

High voltage can kill.

Sensing line connects
TEMPERATURE SELECTOR



A01255
TM5-4120-367-14-3

Figure 5-3. Resistor R1

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

INSTALLATION

- | | |
|---|--------------------|
| a. Slip heat shrink tubing over resistor leads. | . . . |
| b. Use a commercial "butt splice" or solder wire X34A20V (F18H, F18H-3 and F18H-4) or X34A20B (F18H-3A and F18H-4A) to one of the resistor leads. | . . . |
| c. Solder loose end of resistor to terminal 1 of transformer T1. | . . . |
| d. Heat shrink tubing over wire or solder connections. | Use hot air dryer. |
| e. Secure resistor R1 to transformer T1 using "Ty-rap". | . . . |
| f. Replace junction box. | . . . |
| g. Replace top cover. | . . . |
| h. Connect power supply. | . . . |

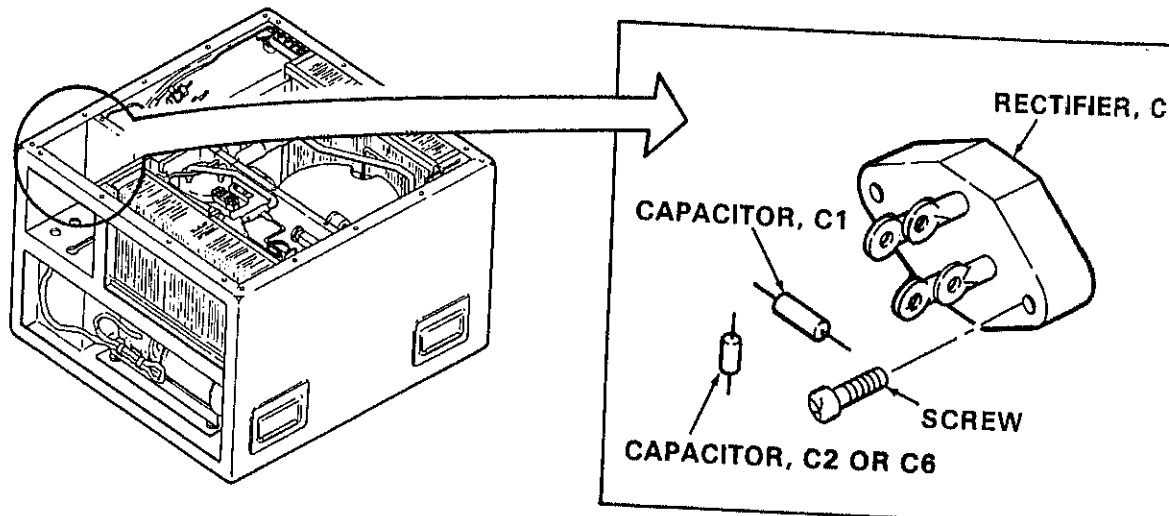


Figure 5-4. Rectifier CR1

A0
TM5-4120-367

5-5. RECTIFIER CR1

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

CATION/ITEM	ACTION	REMARKS
-------------	--------	---------

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High voltage can kill.

- a. Disconnect power supply
- b. Remove top cover from evaporator section.
- c. Remove screws and pull junction box from frame. Use care to avoid breaking sensing line. Sensing line connects TEMPERATURE SELECTOR to sensing line bulb which is behind return air louver.
- d. Tag and pull the four "quick disconnect" terminals from the rectifier.
- e. Remove capacitors C1 and C2 or C6.
- f. Remove two screws and pull rectifier from frame.

LLATION

- a. Bolt rectifier CRI to frame using two screws. Terminal no. 1 at top.
- b. Connect "quick disconnect" terminals.

TERMINAL CONNECTION	
WIRE NO.	TERMINAL
X37A20	1
V6D20	2
X38A20	3
X36A20N	4

- c. Replace capacitors C1 and C2 or C6.
- d. Install junction box.
- e. Replace top cover.
- f. Connect power supply.

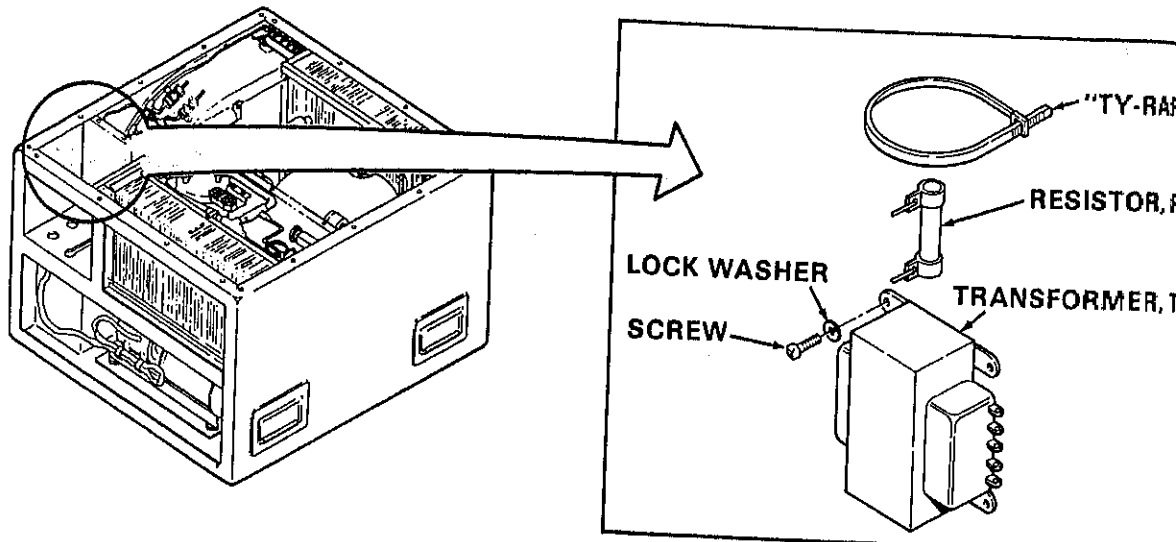


Figure 5-5. Transformer T1

A012
TM5-4120-367-1

5-6. TRANSFORMER T1

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

FORMER TI

WARNING

High voltage can kill.

a. Disconnect power supply from unit.

b. Remove top cover from evaporator section.

c. Remove screws and carefully pull junction box from frame. Use care to avoid breaking sensing line.

Sensing line connects
TEMPERATURE SELECTOR
to sensing bulb which is behind
return air louver.

d. Remove resistor.

Paragraph 5-4.

e. Remove four screws and pull transformer away from frame.

. . .

f. Tag and unsolder or cut the leads at the transformer.

. . .

a. Tag and disconnect leads and check for continuity across the primary winding and then across the secondary winding. If either winding is open, replace the transformer.

. . .

b. Check for shorts between one terminal and transformer case and also between one primary terminal and one secondary terminal using multimeter on high ohms setting. Replace transformer if a short is indicated.

. . .

ACTION

a. Slip heat shrink tubing over the leads.

. . .

b. Solder leads to transformer.

. . .

TERMINAL CONNECTION F18H, F18H-3 & F18H-4	
WIRE NO.	TERMINAL

RESISTOR R1

1

X35A20N

2

X37A20

3

X38A20

4

LOCATION/ITEM

ACTION

REMARKS

INSTALLATION

- c. Heat shrink tubing over the solder connections.
- d. Install resistor.
- e. Slide transformer into place
- f. Install screws.
- g. Replace junction box.
- h. Replace top cover.
- i. Connect power supply.

Use hot air dryer.

Paragraph 5-4.

. . .

. . .

. . .

. . .

5-7. RELAY K4

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUPApplicable Configurations

All

Test Equipment

Multimeter
Stop watch
28VDC power supply

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Solvent PD680

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

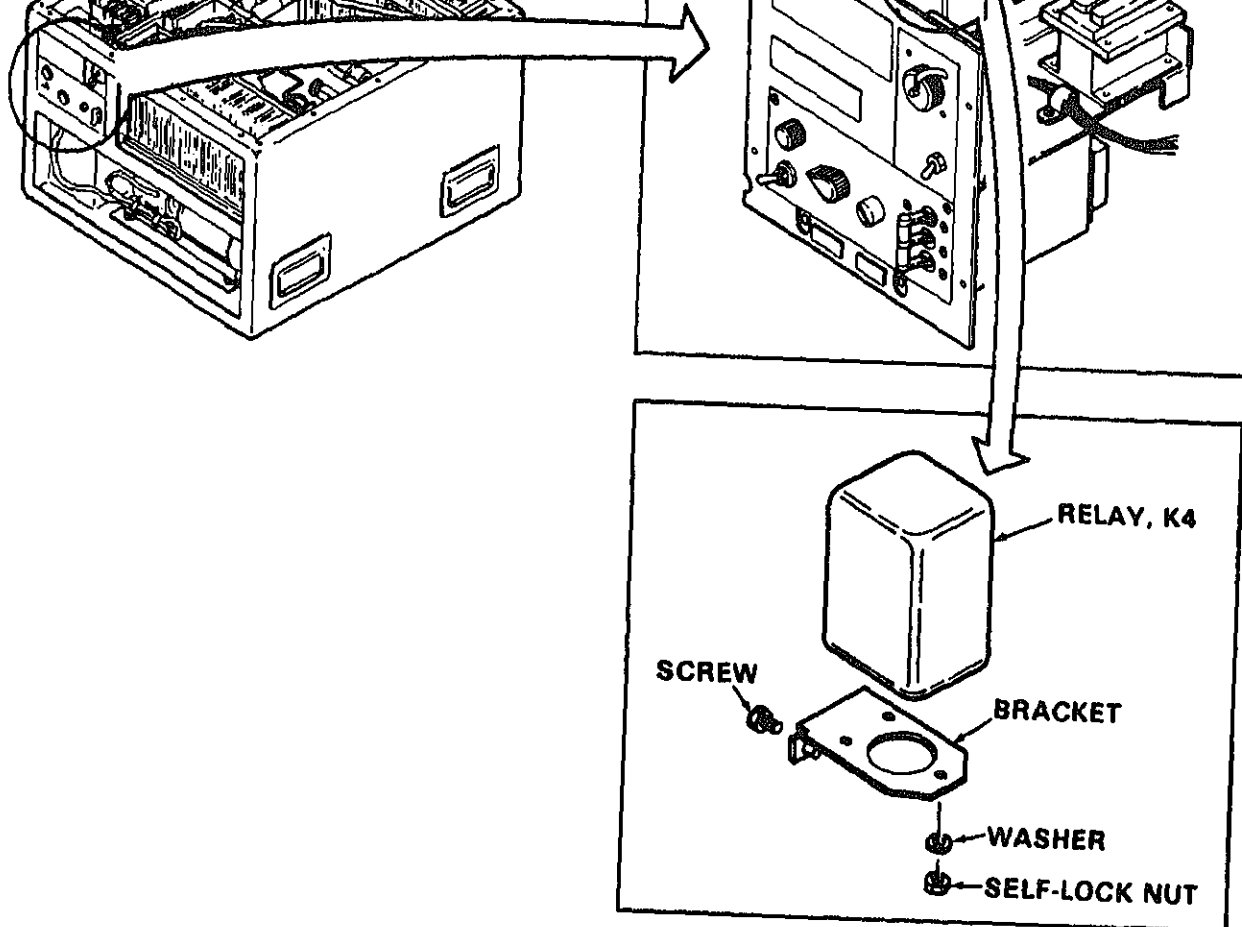
None

Troubleshooting References

None

Personnel Required

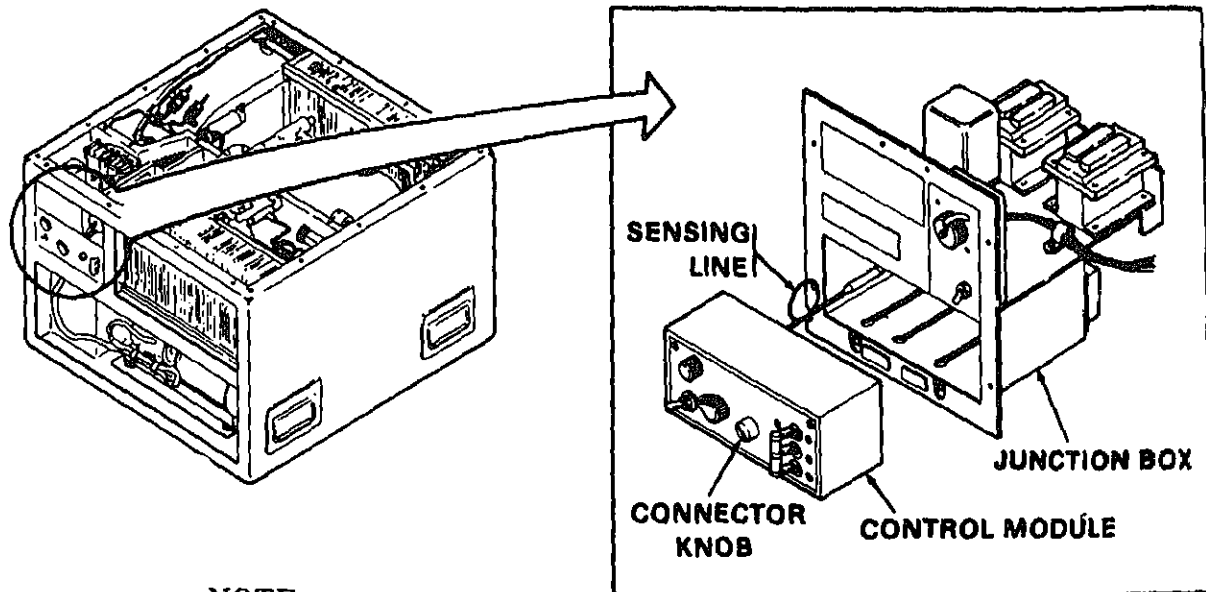
Organizational Maintenance



A01288
TM5-4120-387-14-6

Figure 5-6. Relay K4

LOCATION/ITEM	ACTION	REMARKS
RELAY K4		
REMOVAL	<p>a. Disconnect power supply.</p> <p>b. Remove screws, and carefully pull junction box from the frame. Use care to avoid breaking the sensing line.</p> <p>c. Remove two screws from the side of the junction box frame.</p>	<p>WARNING High voltage can kill.</p> <p>Sensing line connects TEMPERATURE SELECTOR to sensing bulb which is behind return air louver.</p> <p>Bracket and relay can be lifted</p>



NOTE

Sensing line connects **TEMPERATURE SELECTOR** to sensing bulb which is behind return air louver.

A01299
TMS-4120-387-147

Figure 5-7. Control Module Removal

LOCATION/ITEM	ACTION	REMARKS
TESTING	a. Apply 28VDC to terminals 2 and 9; 2 is positive, 9 is negative.	...
	b. Check continuity across terminals, 1 and 3; 5 and 11; and 10 and 8.	...
	c. Read Multimeter. It should indicate that terminals 1 and 3; 5 and 11; and 10 and 8 are closed. Terminals 1 and 4; 5 and 6; and 10 and 7 are open.	<p>NOTE Terminals 5, 6, and 11 are not used for Model F18H single phase.</p>
	d. Remove 28VDC power. Multimeter should indicate that terminals 1 and 4, 5 and 6, and 10 and 7 are closed and that terminals 1 and 3, 5 and 11, and 10 and 8 are open.	...
INSTALLATION	a. Slide heat shrink tubing over the	

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

INSTALLATION

SINGLE PHASE MODEL F18H

WIRE NO.	TERMINAL NO.
X4B16V,	1
X12A16V	
V9A20	2
X11A16V	3
X6A20V	4
X5B16V,	5
X10A16V	
Blank	6
X8A20V	7
X9A16V	8
V16A20N	9
X7A16V	10
Blank	11

3 PHASE MODELS F18H-3 & F18H-4

WIRE NO.	TERMINAL NO.
X7B16A	1
V9A20	2
X12A16A	3
X10A20A	4
X6B16B	5
X9A20B	6
X8A20C	7
X11A16C	8
V14A20N,	9
X44A12N	
X5B16C	10
X13A16B	11

- d. Use hot air dryer to heat shrink tubing on or over the solder connections.
- e. Push relay down into bracket and install the three nuts and washers.
- f. Attach relay and bracket to junction box frame.
- g. Replace junction box.

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter
28VDC power supply or
24VDC battery

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM

ACTION

REMARKS

RELAY K1

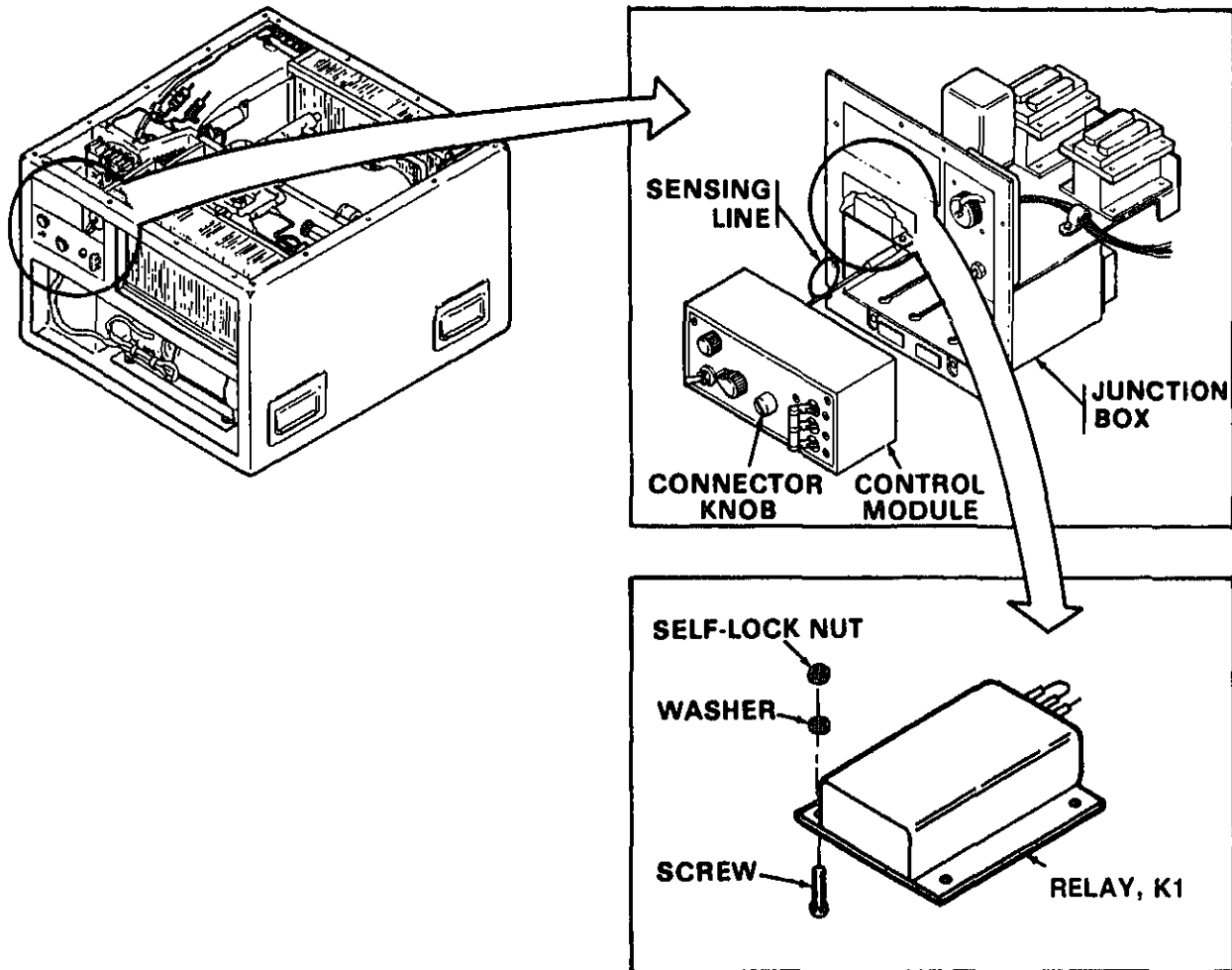
REMOVAL

- a. Disconnect power supply from the air conditioner.
- b. Remove screws and carefully pull the junction box from the frame. Use care to avoid breaking the sensing line.
- c. Use screwdriver to turn control module

WARNING

High voltage can kill.

Sensing line connects
TEMPERATURE SELECTOR
to sensing bulb which is behind
return air louver.



A01280
TM5-4120-367-14-8

Figure 5-8. Relay K1

LOCATION/ITEM	ACTION	REMARKS
	d. Carefully pull control module from the junction box. Use care to avoid breaking the sensing line.	. . .
	e. Remove four screws from top of junction box.	Keep screws, washers, and nuts for installation.
	f. Cut "ty-rap".	
	g. Unsolder or cut leads at relay terminals.	. . .
	a. Connect multimeter to terminals 2 and 3.	. . .
	b. Apply 28VDC to terminals 2 and 5; Terminal 1 is positive, 5 is negative.	Multimeter must show continuity across terminals 1 and 3 within 30±3 seconds of applying voltage.
	a. Slide heat shrink tubing over leads in control panel.	. . .
	b. Solder leads to relay.	Make sure lead location will not interfere with installation.

TERMINAL CONNECTION

WIRE NO.	TERMINAL NO.
V12A20, V13A20	1
V13A20	2
V7A20	3
V14A20N,	5
V15A20N (Three Phase Only)	

c. Hot air dry heat shrink tubing over the solder connections.	Use hot air dryer.
d. Push screws up thru the four mounting holes.	Figure 5-6.
e. Slip relay over the four screws and tighten the screws and nuts.	. . .

RELAY K2 AND K3

k covers:

Removal

Testing

Installation

SETUP

able Configurations

quipment

imeter

DC power supply

Tools

a

als/Parts

e

ment Descriptions

er OFF

illed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM

ACTION

REMARKS

Y K2 OR K3
OVAL

a. Disconnect power supply.

b. Remove screws and carefully pull junction box from frame. Use care to avoid breaking sensing line.

WARNING

High voltage can kill.

Sensing line connects
TEMPERATURE SELECTOR
to sensing bulb which is behind
return air louver.

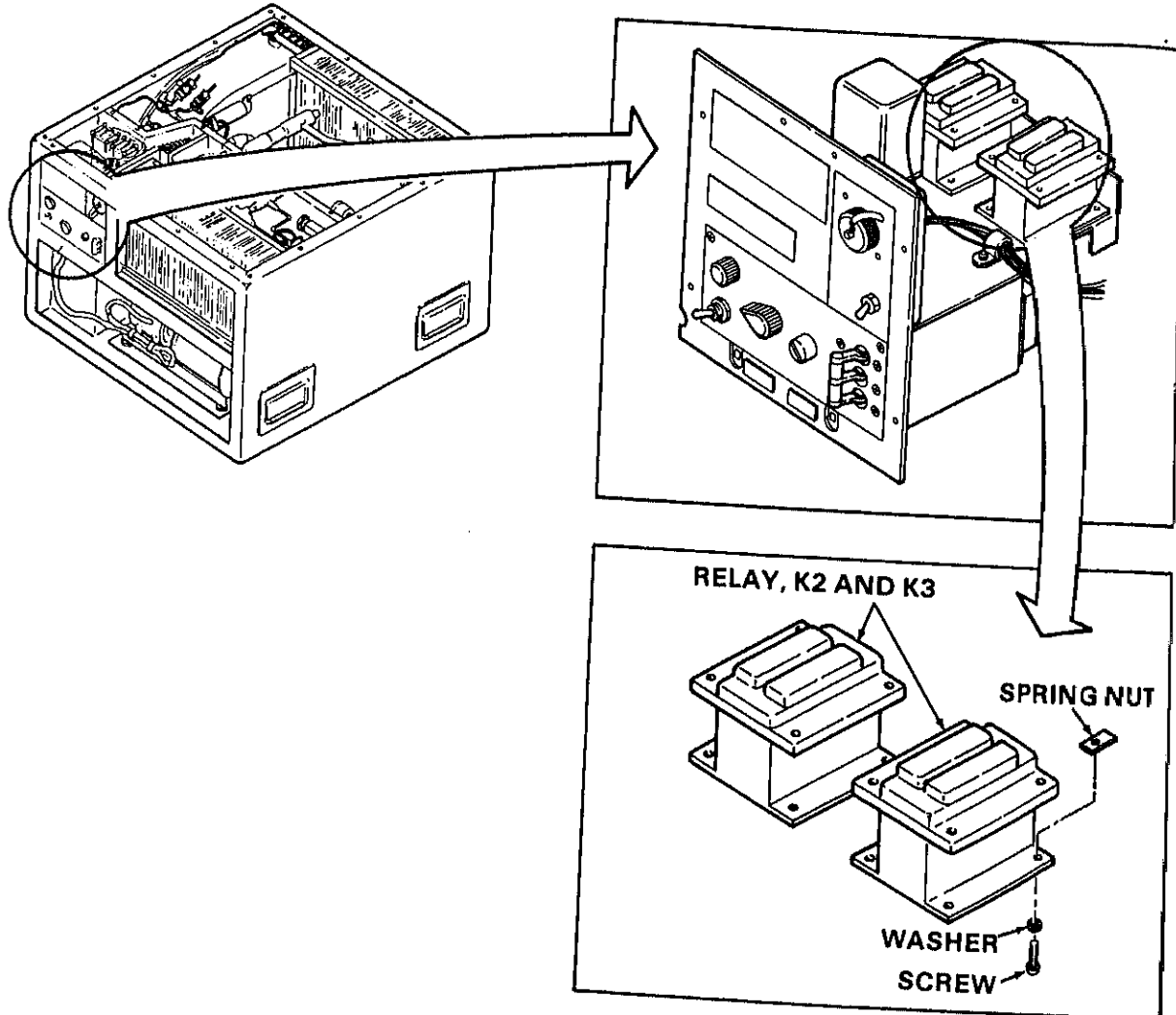


Figure 5-9. Relay K2 and K3

NG

- a. Apply 28VDC to terminals X1 and X2; X1 is positive, X2 is negative. . . .
- b. Check continuity across terminals A1 and A2; B1 and B2, and C1 and C2. The multimeter must show that contacts are closed.
- c. Remove power. Multimeter must show that contacts are open.
- a. Attach relay to control panel frame. Use the removed hardware.
- b. Remove terminal cover to attach leads to new relays. . . .

ALLATION

MODEL F18H RELAY K2

WIRE NO.	TERMINAL NO.
X1E16V	A1
X2E16V	B1
Blank	C1
V3A20	X1
X32A16V	A2
X17B16V,	B2
X31A16V	
Blank	C2
V15A20N,	X2
V17A20N	
and V16A20N	

MODEL F18H RELAY K3

WIRE NO.	TERMINAL NO.
X19C16Y,	A1
X19B12V	
X23B12V,	B1
X23C16Y	
Blank	C1
V8A20, V7A20	X1
X20A12V,	A2
X21A12V	
X24A12V	B2
Blank	C2
V10A20N,	X2
V11A20N,	
V12A20N	

INSTALLATION

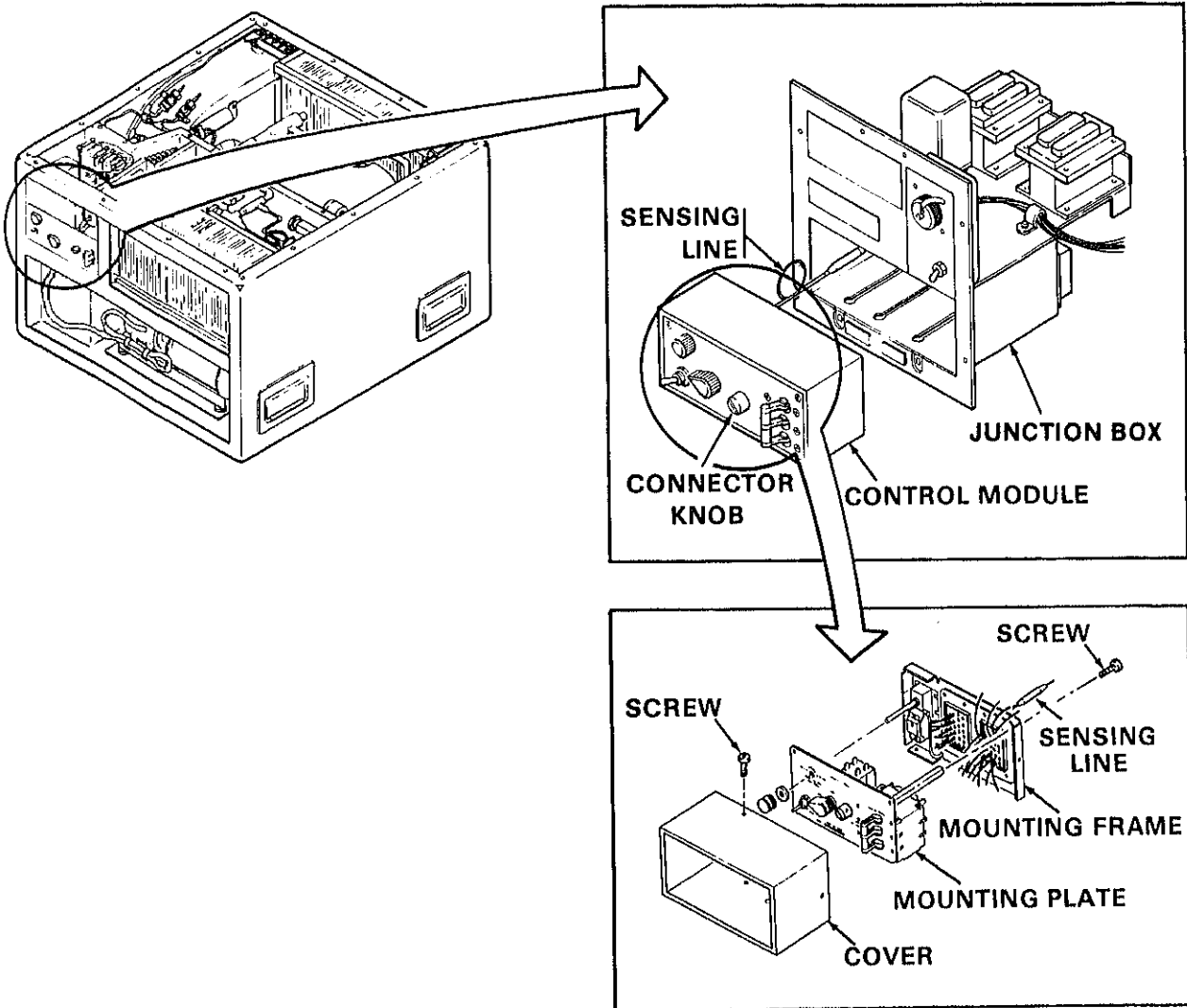
MODELS F18H-3 & KIF-18H-4 RELAY K2

WIRE NO.	TERMINAL NO.
X1E16A	A1
X2J20B, X2E16B	B1
X3E16C	C1
V3A20	X1
X39A16A	A2
X60A16B	B2
X59A16C	C2
V15A20N, V16A20N and V17A20N	X2

MODELS F18H-3 & KIF-18H-4 RELAY K3

WIRE NO.	TERMINAL NO.
X20C16B, X20B12A	A1
X22B12B, X22C16B	B1
X24B12C	C1
V7A20, V8A20	X1
X21A12A	A2
X23A12B	B2
X25A12C	C2
V10A20N, V17A20N and V18A20N.	X2

- c. Replace terminal cover.
- d. Replace junction box.
- e. Connect power supply.



A01282
TM6-4120-367-14-10

Figure 5-10. Control Module

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Electrician

LOCATION/ITEM

ACTION

REMARKS

MODE SWITCH REMOVAL

a. Disconnect power supply.

b. Use a screwdriver to turn the connector knob to the left until it is free. (About five complete turns)

c. Carefully pull the control module from the junction box. Use care to avoid breaking sensing line.

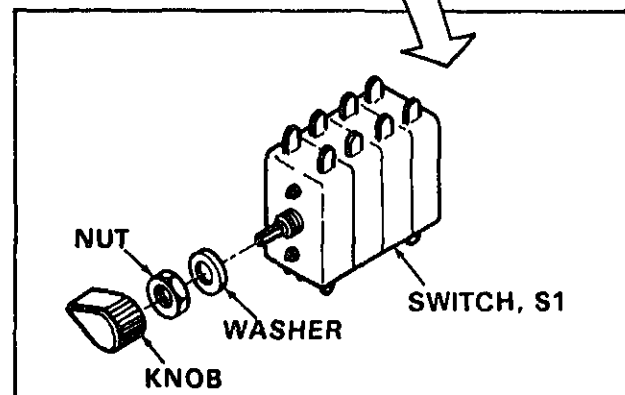
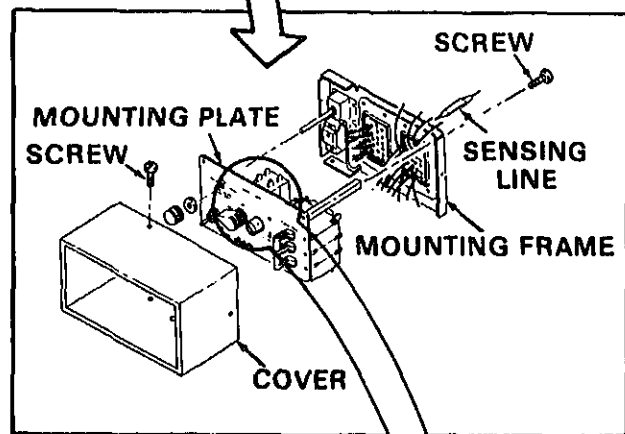
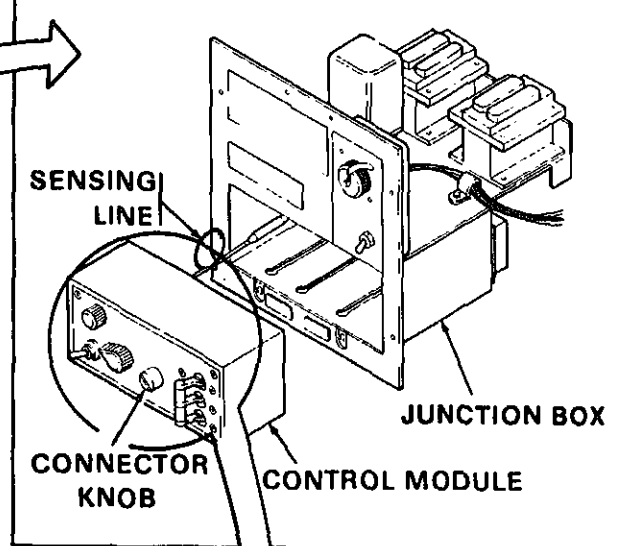
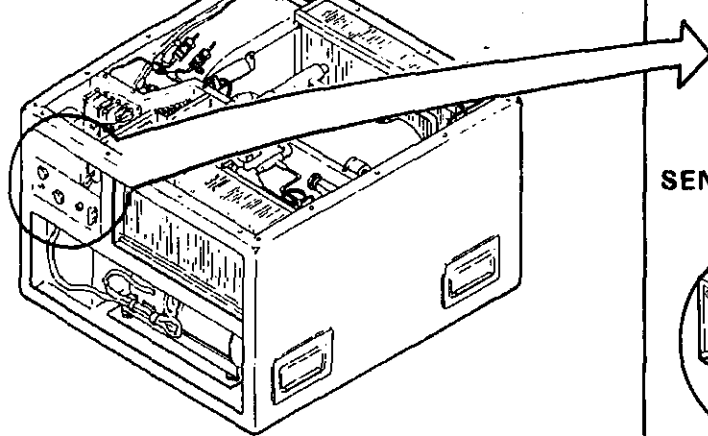
d. Remove four screws and pull cover from

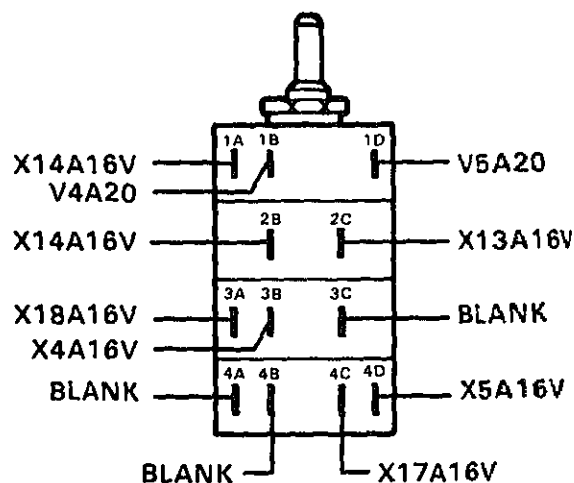
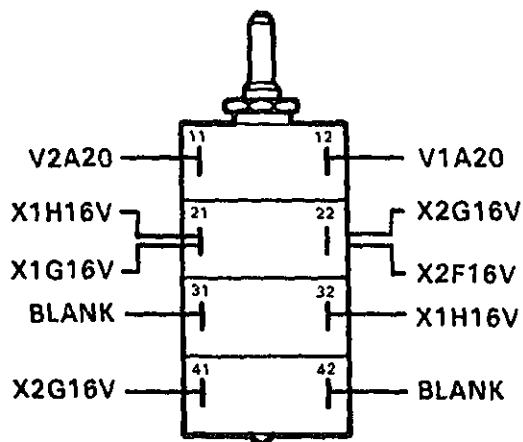
WARNING

High voltage can kill.

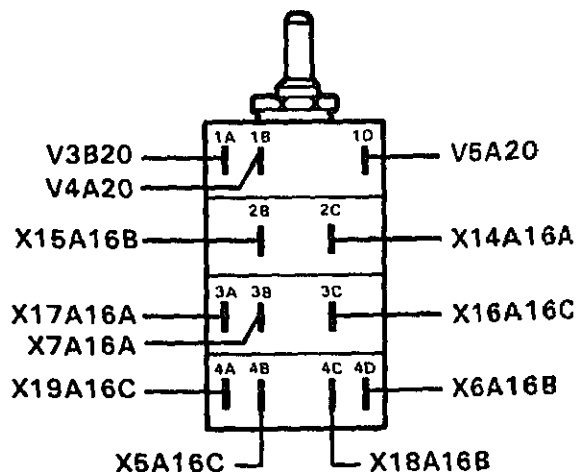
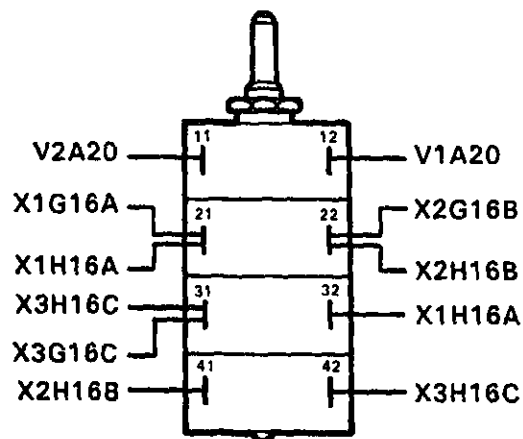
...

Sensing line connects
TEMPERATURE SELECTOR
to sensing bulb which is behind
return air louver.
Figure 6-10





SINGLE PHASE



THREE PHASE

Figure 5-12. Selector Switch Wire Termination

LOCATION/ITEM	ACTION	REMARKS
DOVAL	e. Separate the mounting plate from the mounting frame assembly.	. . .
	f. Loosen setscrew in knob to pull knob from switch shaft.	. . .
	g. Remove switch nut and washer.	Discard nut and washer. New nut and washer included with new switch.
	h. Tag and pull "quick disconnects" from switch	. . .
ING	a. See table 4-3, step 7.	. . .
	a. Push "quick disconnect" terminals onto switch terminals	. . .
INSTALLATION	b. Slip switch into the mounting plate.	. . .
	c. Install switch nut and washer.	Supplied with switch
	d. Assemble control module.	. . .
	e. Slide control module into junction box.	. . .
	f. Turn connector knob to the right (About five full turns)	. . .
	g. Connect power supply.	. . .

TEMPERATURE SWITCH S3

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM

ACTION

REMARKS

TEMPERATURE SWITCH

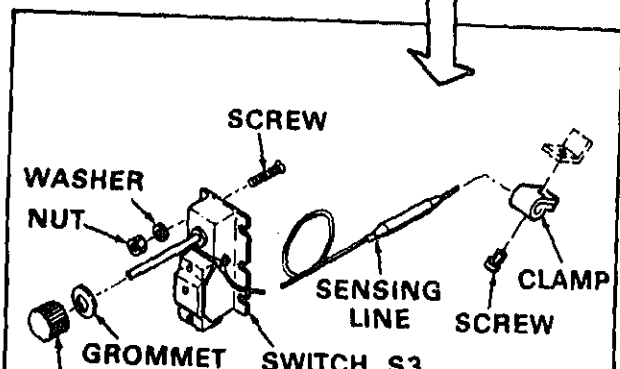
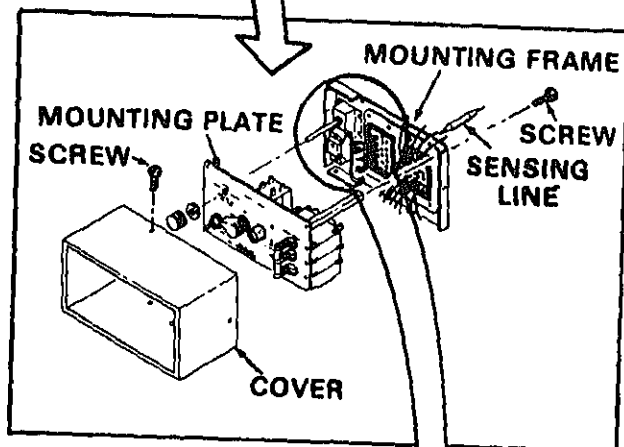
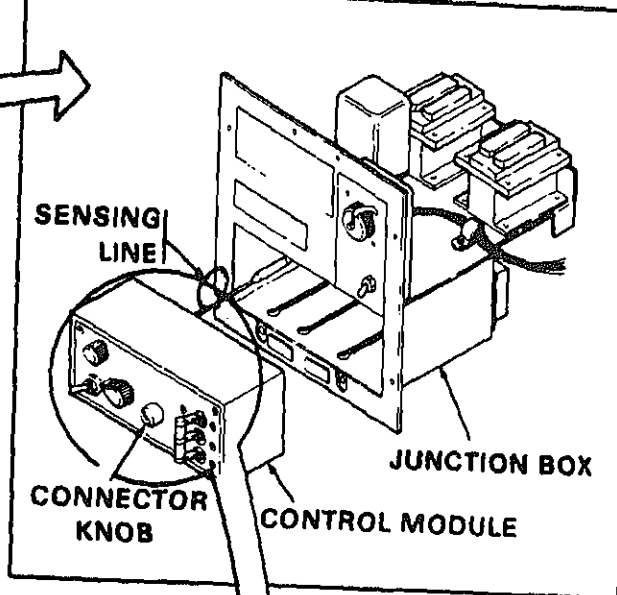
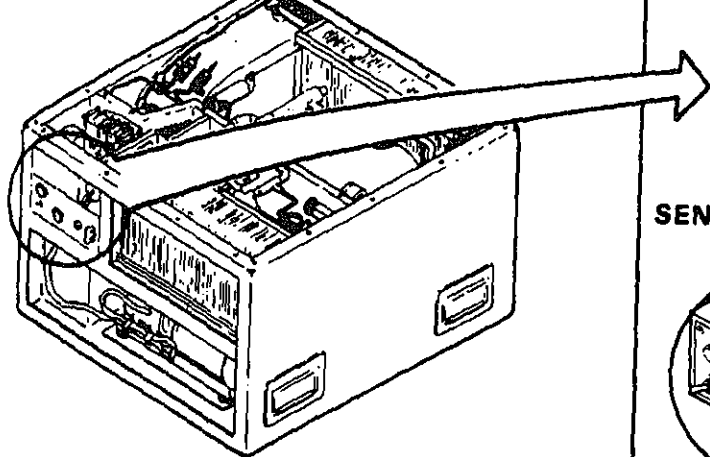
REMOVAL

- a. Disconnect power supply from air conditioner
- b. Turn connector knob to the left (about five full turns) until it is free.
- c. Carefully pull the control module from the junction box. Use care to avoid breaking sensing line

WARNING

High voltage can kill.

Sensing line connects
TEMPERATURE SELECTOR



LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
	f. Loosen setscrew in knob to pull knob from switch shaft.	. . .
	g. Remove return air louver and filter.	Paragraph 5-19
	h. Remove top cover from evaporator section.	
	i. Pull control module from frame.	. . .
	j. Remove tube clamps to remove sensing bulb from evaporator blower housing.	Keep clamps and hardware for installation.
	k. Carefully work tube and bulb from frame.	. . .
	l. Remove four screws to pull switch from mounting frame.	Keep screws, washers, nuts, for installation.
	m. Pull "quick disconnect" terminals from switch.	. . .
TESTING	a. See Table 4-3, Step 8	. . .
INSTALLATION		
	a. See wiring diagram FO-1, FO-3, FO-5 or FO-6.1.	FO-1 for F18H, FO-3 for F18H-3, FO-5 for KIF-18H-4, FO-6.1 for F18H-3A and F18H-4A.
	b. Push "quick disconnects" onto switch.	

SINGLE PHASE

WIRE NO.	TERMINAL NO.
V1A20	1
V2A20, V6A20	2

3 PHASE (F18H-3 and KIF-18H-4)

V1A20	2
V2A20, V6A20	1

3 PHASE (F18H-3A and F18H-4A)

V1A20	3 BLUE
-------	--------

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

INSTALLATION

h. Install control module in junction box.

. . .

i. Install junction box.

. . .

j. Connect power supply.

. . .

EVAPORATOR FAN SWITCH S2.

Check covers:

Removal

Testing

Installation

SETUP

Special Environmental Conditions

Table Configurations

None

General Safety Instructions

Equipment

See WARNING page

Timer

References

Tools

None

Labels

Troubleshooting References

Materials/Parts

None

Personnel

Personnel Required

Equipment Descriptions

Refrigeration specialist

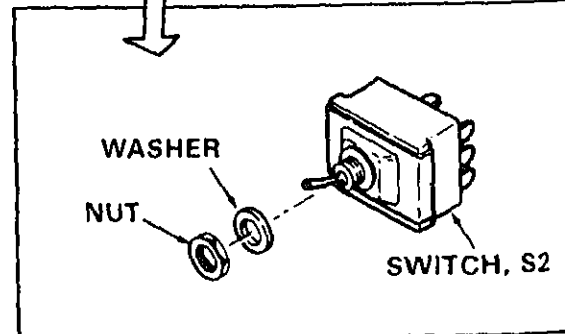
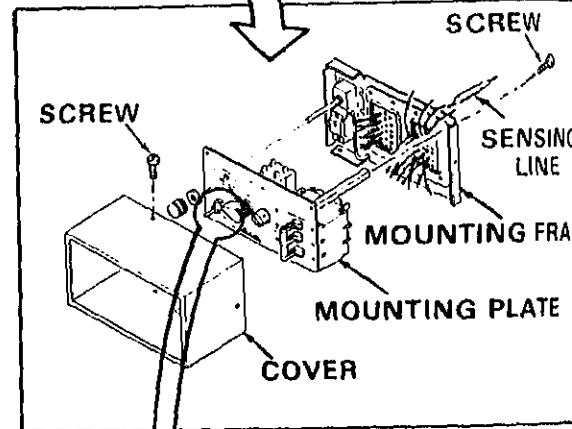
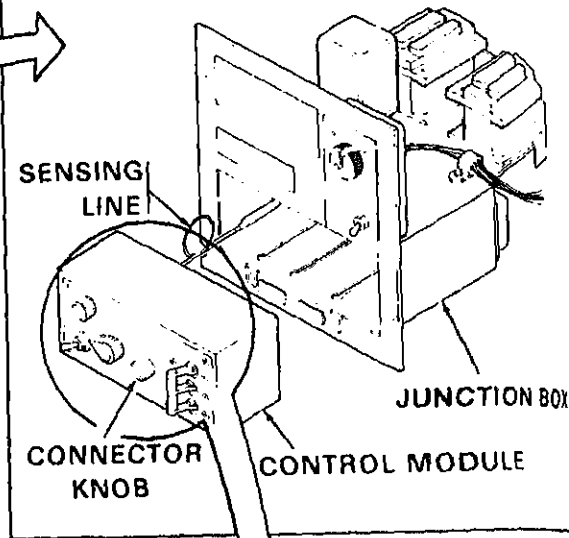
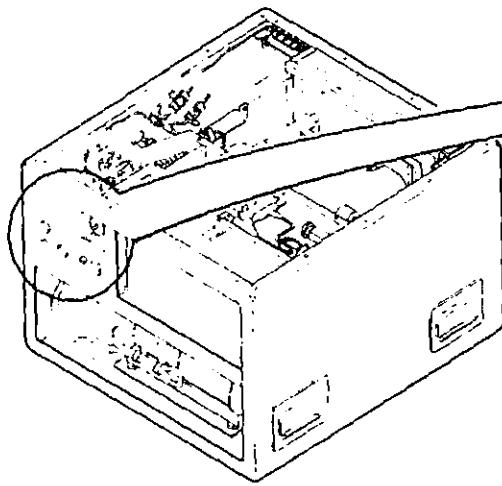
Power OFF

Installed in shelter

LOCATION/ITEM

ACTION

REMARKS



LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

DOVAL

- | | |
|---|--|
| d. Remove four screws in order to pull cover from mounting frame. | . . . |
| e. Remove four screws to separate mounting plate from mounting frame. | . . . |
| f. Remove switch nut and washer to pull switch from mounting plate. | If switch is to be replaced, discard nut and washer. Supplied with new switch. |
| g. Tag and pull "quick disconnects" from switch terminals. | . . . |

NG

- | | |
|--|-------|
| a. Check continuity in both positions. Continuity should be indicated. | . . . |
|--|-------|

ALLATION

- | | |
|---|---|
| a. See figure FO-1, FO-3, FO-5, or FO-6.1. | FO-1 for F18H, FO-3 for F18H-3, FO-5 for KIF-18H-4, FO-6.1 for F18H-3A and F18H-4A. |
| b. Push "quick disconnect" terminals onto switch. | |

SINGLE PHASE MODEL F18H

WIRE NO.	TERMINAL NO.
X25A16V	A1
X26A16V	B1
Blank	C1
X13A16V, X15A16V	A2
X16A16V	B2
Blank	C2
X27A20V	A3
X28A20V	B3
Blank	C3

3 PHASE (F18H-3 and KIF-18H-4)

WIRE NO.	TERMINAL NO.
X26A16A	A1
X28A16B	B1
X27A17C	C1
X14A16A	A2
X15A16B	B2
X16A16C	C2

INSTALLATION

- | | |
|---|-------|
| c. Slide switch into mounting plate assembly. | . . . |
| d. Thread nut and washer onto switch shaft. | . . . |
| e. Assemble control module. | . . . |
| f. Install control module into junction box. | . . . |
| g. Tighten connector knob. | . . . |
| h. Connect power supply. | . . . |

5-13. CONTROL CIRCUIT BREAKER CB2.

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUPSpecial Environmental ConditionsApplicable Configurations

None

All

General Safety InstructionsTest Equipment

See WARNING page

Multimeter

ReferencesSpecial Tools

None

None

Troubleshooting ReferencesMaterials/Parts

None

None

Personnel RequiredEquipment Descriptions

Refrigeration specialist

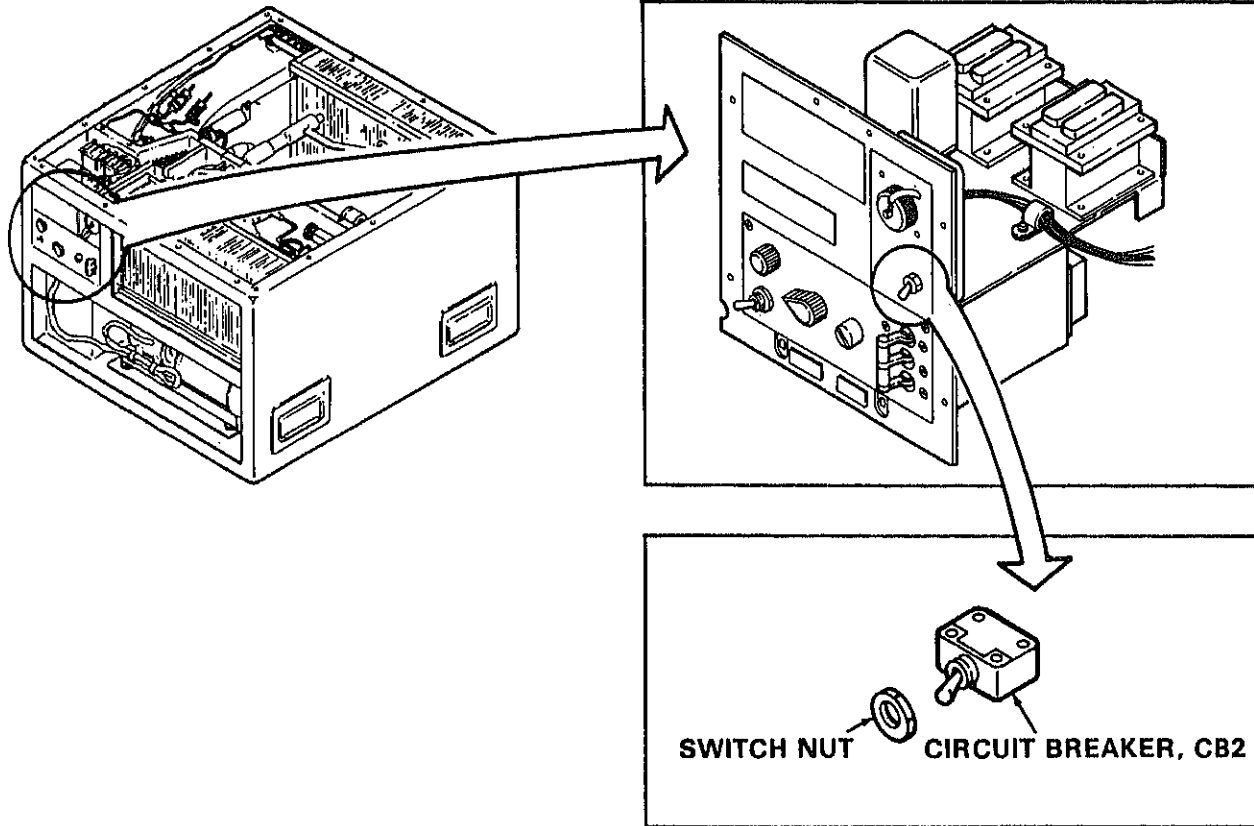


Figure 5-15. Circuit Breaker CB2

CIRCUIT BREAKER CB2

REMOVAL

- a. Disconnect power supply from air conditioner.
- b. Remove screws to pull junction box from frame. Use care to avoid breaking sensing line.
- c. Remove nut from circuit breaker shaft.
- d. Pull circuit breaker away from junction box.
- e. Remove circuit breaker terminal screws to lift wires from circuit breaker. Tag removed wires.

WARNING

High voltage can kill.

Sensing line connects
TEMPERATURE SELECT
to sensing bulb.If circuit breaker is to be replaced,
discard nut. Supplied with replacement
circuit breaker.

TESTING

See Table 4-3, step 1

INSTALLATION

- a. Install wires:

TERMINAL CONNECTIONS

SINGLE PHASE MODEL F18H

WIRE NO.	TERMINAL
X29B20V	1
X1F20V	2

3 PHASE MODELS F18H-3 AND F18H-4

WIRE NO.	TERMINAL
X2J20B	1
X32A20B	2

- b. Install circuit breaker in junction box.
- c. Thread nut onto circuit breaker shaft.
- d. Install junction box.

Locating dimple provided for
correct installation.

CIRCUIT BREAKER CBI

k covers:

Removal

Testing

Installation

SETUP

ble Configurations

quipment

meter

Tools

ols/Parts

ent Descriptions

or OFF

led in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

CATION/ITEM

ACTION

REMARKS

UIT BREAKER CBI

VAL

a. Disconnect power supply.

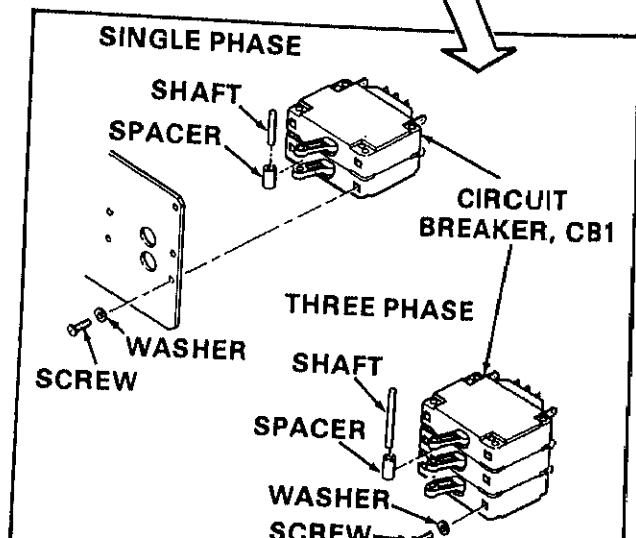
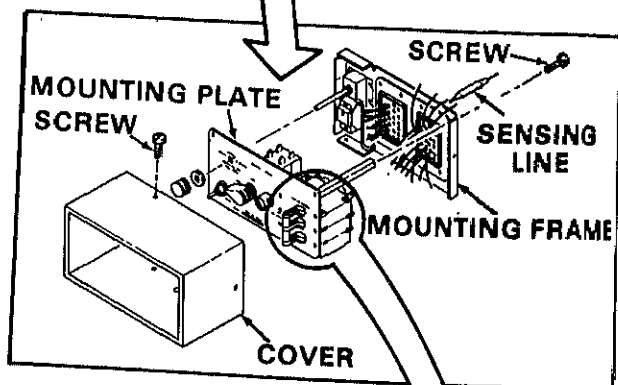
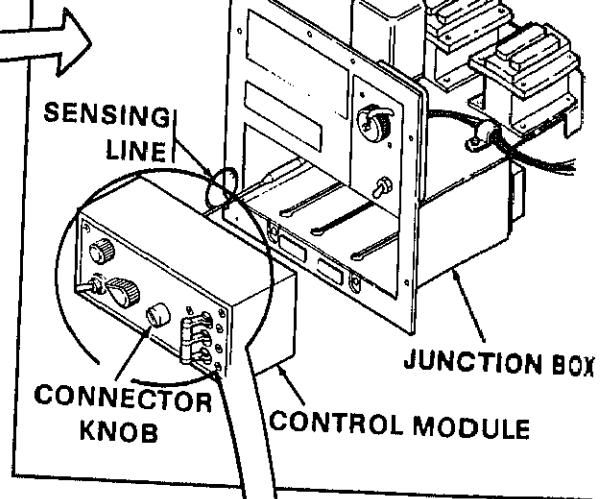
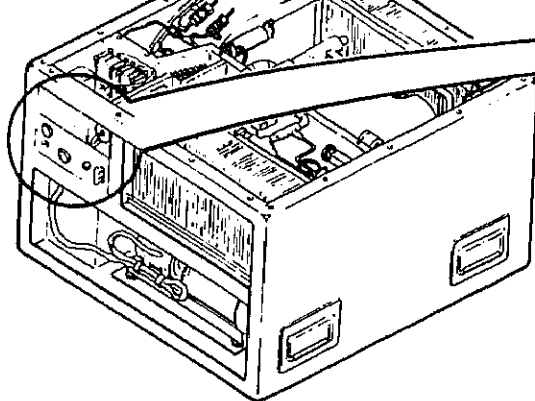
b. Drive out handle shaft and spacers.

c. Turn connector knob to the left (about

WARNING

High voltage can kill.

If circuit breaker is to be replaced, discard. Supplied with new circuit breaker.



LOCATION/ITEM	ACTION	REMARKS
OVAL	e. Remove four screws to pull cover from control module.	. . .
	f. Remove four screws to separate mounting frame assembly.	. . .
	g. Tag and pull "quick disconnect" terminals from circuit breaker.	. . .
	h. Remove four screws (single phase) or six screws (3 phase) to pull circuit breaker from mounting plate.	. . .
ING	a. See Table 4-3, step 1.	. . .
ATTENTION	a. See figure FO-1, FO-3, FO-5, or FO-6.1.	. . .
	b. Push "quick disconnect" terminals onto circuit breaker.	. . .

Single Phase Model F18H

WIRE NO.	TERMINAL
X30A20V	NO
X29A20V	C
X1D12V	A1
X2D12V	B1
X19A12V	A2
X23A12V	B2

3 Phase Models F18H-3 & F18H-4

WIRE NO.	TERMINAL
X57A20B	NO
X33B20B	C
X1D12A	A1
X2D12B	B1
X3D12C	C1
X20A12A	A2
X22A12B	B2
X24A12C	C2

- | | |
|--|--|
| c. Drive out shaft and handle spacers. | Save for step e. |
| d. Secure circuit breaker to mounting frame. Four screws (single phase), six screws (3 phase). | Terminals A1, B1, C1, to outside of frame. |

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Heat-shrink tubing
Solder
Cleaning Cloths
Hot air dryer

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM

ACTION

REMARKS

CONNECTOR P2

REMOVAL

- a. Disconnect power supply from air conditioner.

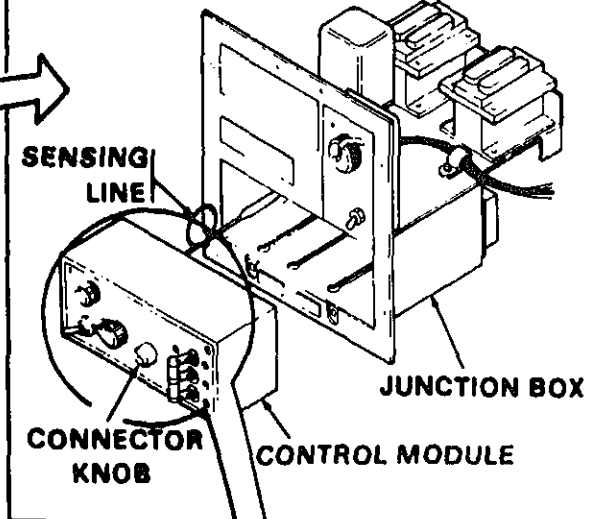
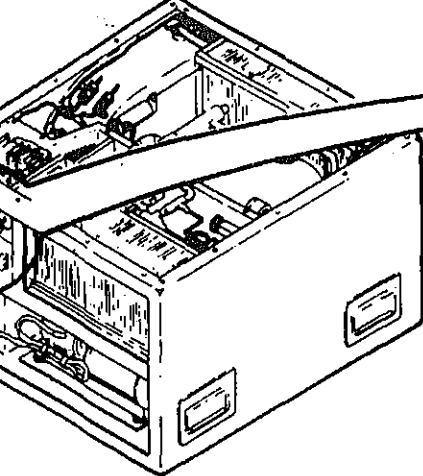
WARNING

High voltage can kill.

NOTE

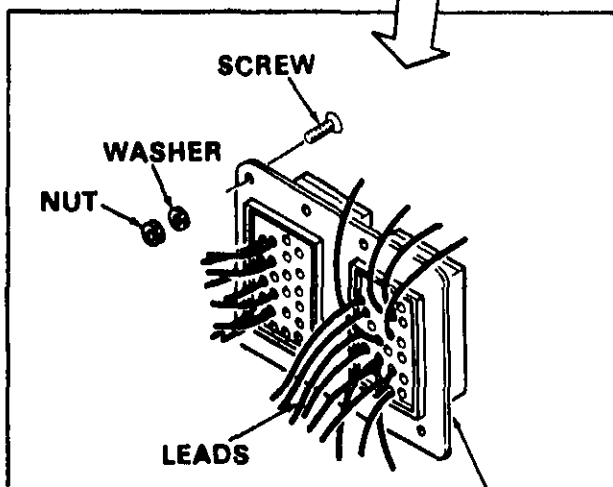
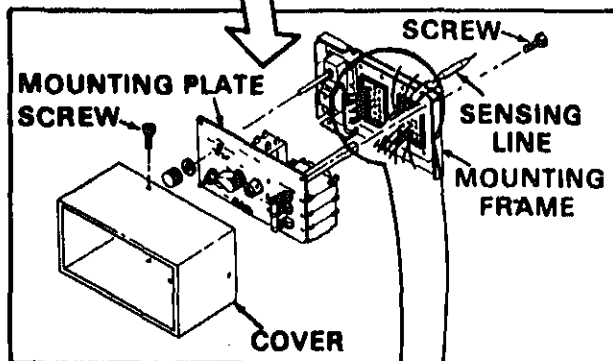
Connector is "two gang" connector. Figures FO-1, FO-3, FO-5, and FO-6.1 label as P2A and P2B.

- b. Turn connector knob to the left (1)



NOTE

Connector knob was supplied on units to 1983. This knob is not supplied on F18H-3A or F18H-4A units and is not required on existing F18H, F18H-3 or KIF-18H-4 units. Use screw driver slot in end of shaft.



LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

REMOVAL

- | | |
|---|---|
| c. Pull control module from junction box.
Use care to avoid breaking sensing line. | Sensing line connects
TEMPERATURE SELECTOR
to sensing bulb. |
| d. Remove four screws to pull cover from
control module frame. | . . . |
| e. Remove four screws to separate mounting
plate assembly from mounting frame
assembly. | . . . |
| f. Remove screws, washers, and nuts to
separate connector from mounting frame
assembly. | . . . |
| g. Tag and unsolder wires from connector. | . . . |

INSTALLATION

- | | |
|--|--|
| a. Slide heat shrink tubing over wires. | . . . |
| b. Solder wires to connector. See figure
FO-1, FO-3, FO-5, or FO-6.1. | FO-1 for F18H. FO-3 for F18H-1A.
FO-5 for KIF-18H-4, FO-6.1 for
F18H-3A and F18H-4A. |

Single Phase Model F18H

WIRE NO.	P2A TERMINAL
X25A16V	1
X26A16V	2
X14A16V	3
X27A20V	4
X28A20V	5
X16A16V	6
X15A16V	7
X17A16V	8
X18A16V	9
X1D12V, X1G16V	11
X2D12V, X2F16V	12
Blank	13
X19A12V	14
X23A12V	15
Blank	16

Single Phase Model F18H

WIRE NO.	P2B TERMINAL
----------	--------------

WIRING**3 Phase Models F18H-3 & KIF-18H-4**

WIRE NO.	P2A TERMINAL
X26A16A	1
X28A16B	2
X27A16C	3
X29A18A	4
X31A18B	5
X20A18C	6
X17A16A	7
X18A16B	8

3 Phase Models F18H-3 & KIF-18H-4

WIRE NO.	P2A TERMINAL
X19A16C	9
X1D12A, X1G16A	11
X2D12B, X2G16B	12
X3D12C, X3G16C	13
X20A12A	14
X22A12B	15
X24A12C	16

3 Phase Models F18H-3 & KIF-18H-4

WIRE NO.	P2B TERMINAL
X5A16C	1
X6A16B	2
V5A20	3
V4A20	4
V3B20	5
X7A16A	6
X33B20B	7
X57A20B	8
V6A20	10
X4D16N	11

c. Heat shrink tubing over soldered connections.

d. Slide connector into mounting plate assembly.

e. Secure to mounting plate assembly.

5-16. CAPACITORS (SINGLE PHASE) C2, C3, C5

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

Model F18H Single Phase

Test Equipment

None

Special Tools

None

Materials/Parts

Grounding Rod

Equipment Descriptions

Power OFF
Installed in shelter

Special Environment

None

General Safety Instr

See WARNING pa

References

None

Troubleshooting Refe

None

Personnel Required

Refrigeration speci

LOCATION/ITEM

ACTION

REMARKS

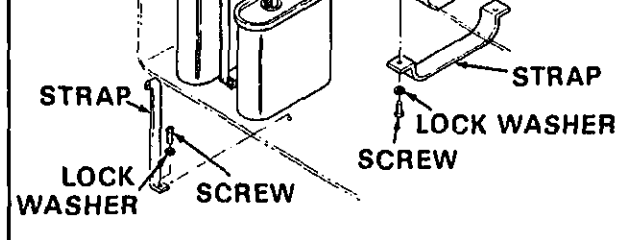
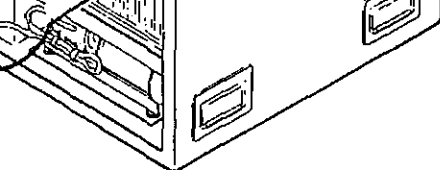
REMOVAL

- a. Disconnect power supply from air conditioner.
- b. Remove evaporator air inlet and filter.
- c. Ground the capacitors to discharge electrical charge.
- d. Tag and pull "quick disconnect" terminal

WARNI

High voltage

Use grounding rod.



A01270
TM5-4120-367-14-18

Figure 5-18. Capacitor C2, C3, and C5 (Single Phase)

ACTION/ITEM	ACTION	REMARKS
INSTALLATION	a. See wiring diagram FO-1.	. . .
	b. Push "quick disconnect" terminals onto capacitor terminals.	. . .
CAPACITOR C2		
WIRE NO.	TERMINAL	
X12A16V	1	
X7A16V	2	
CAPACITOR C3		
X16B16V	1	
X15B16V	2	
CAPACITOR C5		
X21A12V	1	
X22A12V	2	
	c. Secure capacitor in place.	. . .
	d. Replace air filter and louver.	. . .
	e. Connect power supply.	. . .

This task covers:

- a. Removal
- b. Testing
- c. Installation

INITIAL SETUP

Applicable Configurations

Model F18H Single Phase

Test Equipment

Multimeter

Special Tools

None

Materials/Parts

None

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

RELAY K5

NOTE

Air Conditioner will have to be removed from installed position to replace relay K5.

REMOVAL

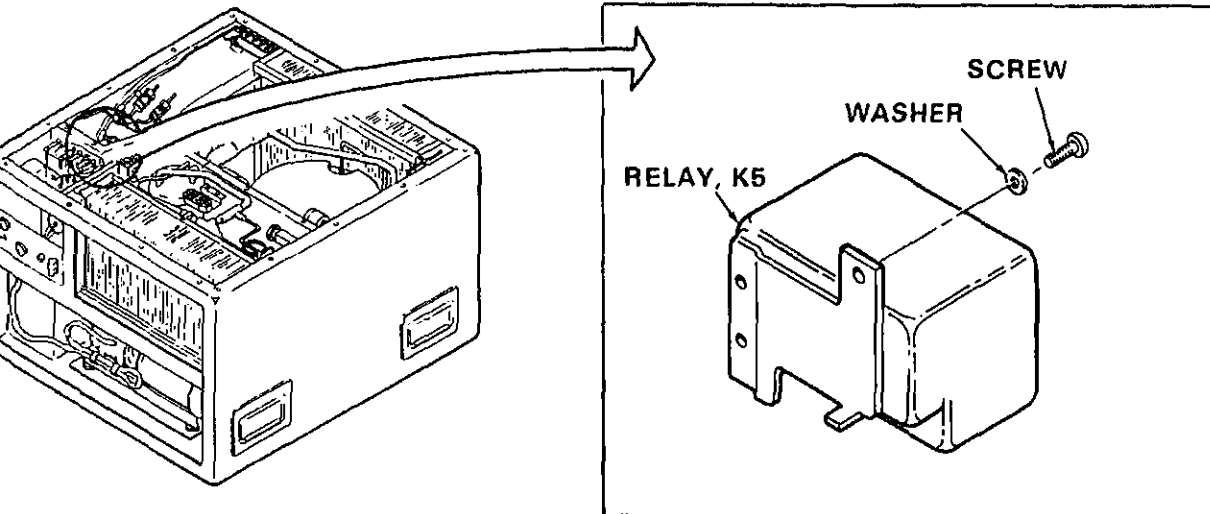
- a. Disconnect power supply.

- b. Remove air conditioner from installed position.

WARNING

High voltage can kill.

Paragraph 3-5.



A01271
TM5 4120-367-14-19

Figure 5-19. Relay K5 (Single Phase)

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

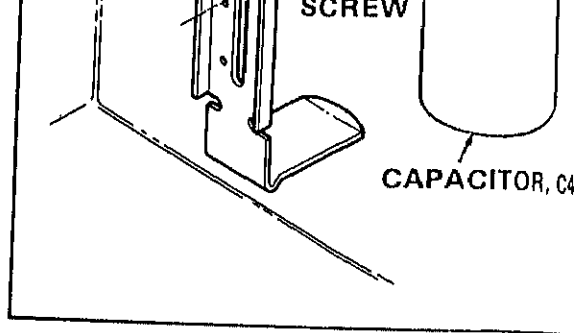
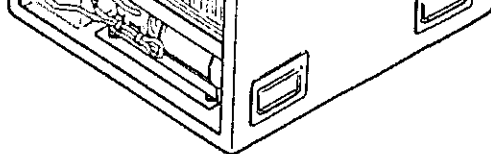
TING	See Table 4-3, step 11.	. . .
------	-------------------------	-------

ALLATION	a. Bolt relay to frame using removed screws and washers.	. . .
	b. Push "quick disconnect" terminals onto relay terminals.	. . .

TERMINAL CONNECTIONS

WIRE NO.	TERMINAL
X52A16V	1
X22B12V, X48A12V	2
X20B12V, X49A12V	4
X50A16V	
X24B12V, X47A12V	5

c. Replace top three covers.	. . .
d. Install air conditioner.	Paragraph 3-5.



TM5-4120-367-142

Figure 5-20. Capacitor C4 (Single Phase)

5-18. CAPACITOR C4 (SINGLE PHASE)

This task covers:

- Removal
- Installation

INITIAL SETUP

Applicable Configurations

Model F18H, Single Phase

Test Equipment

None

Special Tools

None

Materials/Parts

Grounding Rod

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Refrigeration specialist

ION/ITEM	ACTION	REMARKS
----------	--------	---------

OR C4

NOTE

Air conditioner will have to be removed from installed position to replace capacitor C4.

a. Disconnect power supply.

WARNING

High voltage can kill.

b. Remove air conditioner from installed position.

Paragraph 3-5.

c. Remove all three top covers.

. . .

d. Pry cap from capacitor

. . .

e. Ground capacitor to discharge electrical charge.

Use grounding rod.

f. Tag and pull "quick disconnect" terminals from capacitor.

. . .

g. Pull capacitor from retainer.

. . .

TION

a. Push terminals onto capacitor.

. . .

TERMINAL CONNECTIONS

WIRE NO.	TERMINAL
X50A16V	1
X52A16V	2

b. Install cap.

. . .

c. Snap capacitor into retainer.

. . .

d. Replace top three covers.

. . .

e. Install air conditioner.

Paragraph 3-5.

. . .

5-19. AIR FILTER

This task covers:

- A. Removal
- b. Cleaning
- c. Inspection
- d. Installation

<u>INITIAL SETUP</u>	<u>Equipment Descriptions</u>
<u>Applicable Configurations</u>	Power OFF Installed in shelter
All	<u>Special Environmental Conditions</u>
<u>Test Equipment</u>	None
None	<u>General Safety Instructions</u>
<u>Special Tools</u>	See WARNING page
None	<u>References</u>
<u>Materials/Parts</u>	None
SAE 30 oil	<u>Troubleshooting References</u>
Solvent PD680	None
Detergent Solution	<u>Personnel Required</u>
Cleaning Cloths	Organizational Maintenance
Container to hold solvent and air filter.	

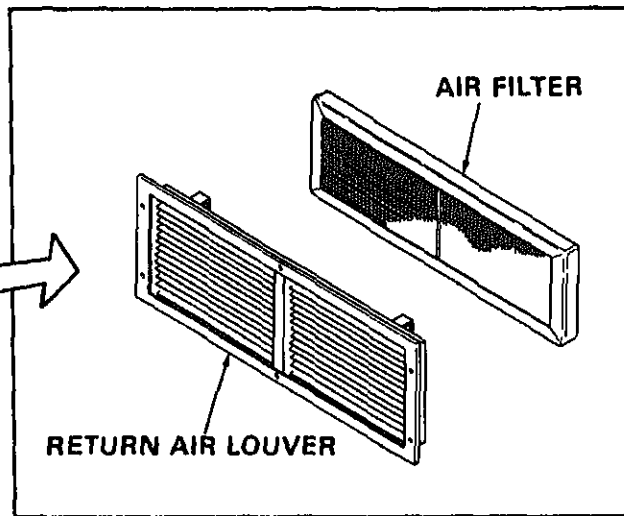
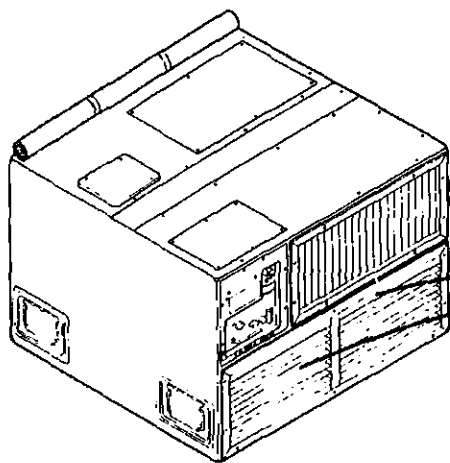
LOCATION/ITEM

ACTION

REMARKS

NOTE

The air filter consists of a shredded aluminum foil maze held between screens in an aluminum channel frame. The filter can be cleaned and re-used repeatedly. Airflow markings (arrows) printed on the frame make it easy to replace the filter in the correct



A01273
TM5-4120-367-14-21

Figure 5-21. Return Air Filter

LOCATION/ITEM

ACTION

REMARKS

CLEANING

WARNING

Dry cleaning solvent (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

- Immerse the filter in detergent solution or dry cleaning solvent (Fed Spec P-D-680). . . .
- Agitate until dirt is removed, using a soft brush if necessary to loosen caked-on dirt. . . .
- Rinse in clear water or clean dry cleaning solvent. . . .
- Drain, then hold filter horizontal and tap each edge on bench or floor to dislodge droplets. . . .

INSPECTION

- a. Inspect the filter for damage such as perforations or punctures in the screen and aluminum foil maze that could permit passage of unfiltered air.
- b. Inspect for areas of packed or crushed maze material that would obstruct airflow through the filter.
- c. Check for deformation of the frame, and straighten if possible without crushing maze material.
- d. Replace filter if crushed, punctured, badly deformed, or broken.

INSTALLATION

- a. Spray a very light coat of SAE oil on air intake side of air filter.
- b. Drain filter for eight hours.
- c. Wipe off excess oil.

NOTE

Airflow arrows on filter point inward toward fan intake.

- d. Slide filter into brackets on return air louver.
- e. Install return air louver.

5-20. MIST ELIMINATOR

This task covers:

- a. Removal
- b. Cleaning
- c. Inspection
- d. Installation

Equipment

ne

Tool Tools

ne

Materials/Parts

vent PD 680

ergent

aning Cloths

ntainer to hold solvent

d mist eliminator

Equipment Descriptions

wer OFF

olled in shelter

See WARNING page

References

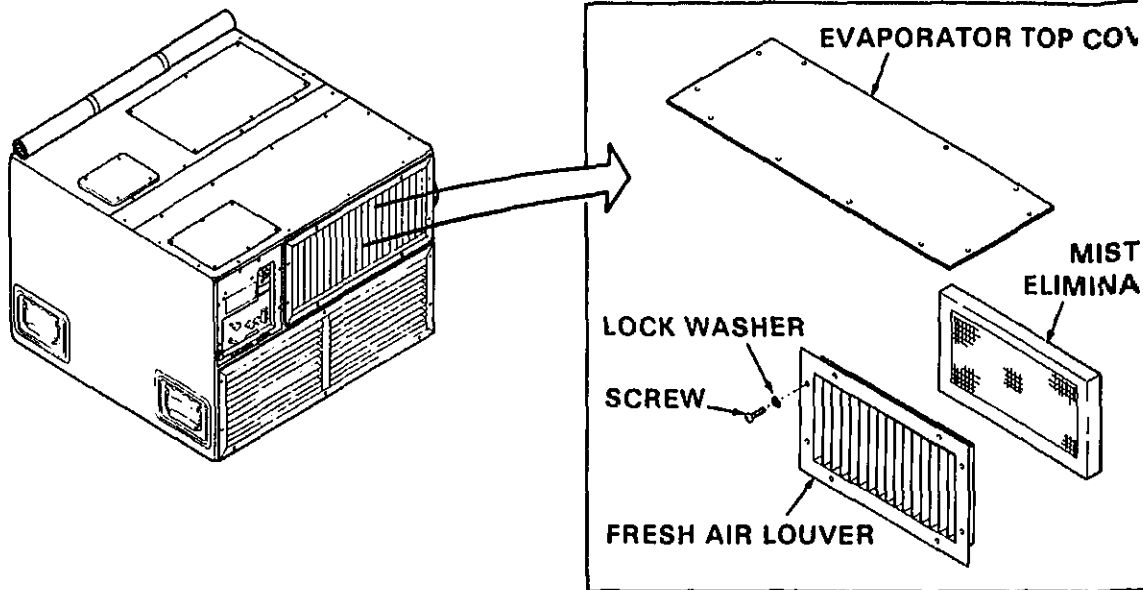
None

Troubleshooting References

None

Personnel Required

Organizational Maintenance



TM5-4120-31

Figure 5-22. Mist Eliminator

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

NOTE

The purpose of the mist eliminator is to trap droplets of condensate water formed on the evaporator coil, so that droplets will not be blown into the air conditioned space.

REMOVAL

- Remove evaporator top cover. . . .
- Remove air outlet louver. . . .
- Pry or lift mist eliminator at outer ends of bottom part of frame. . . .

ING

WARNING

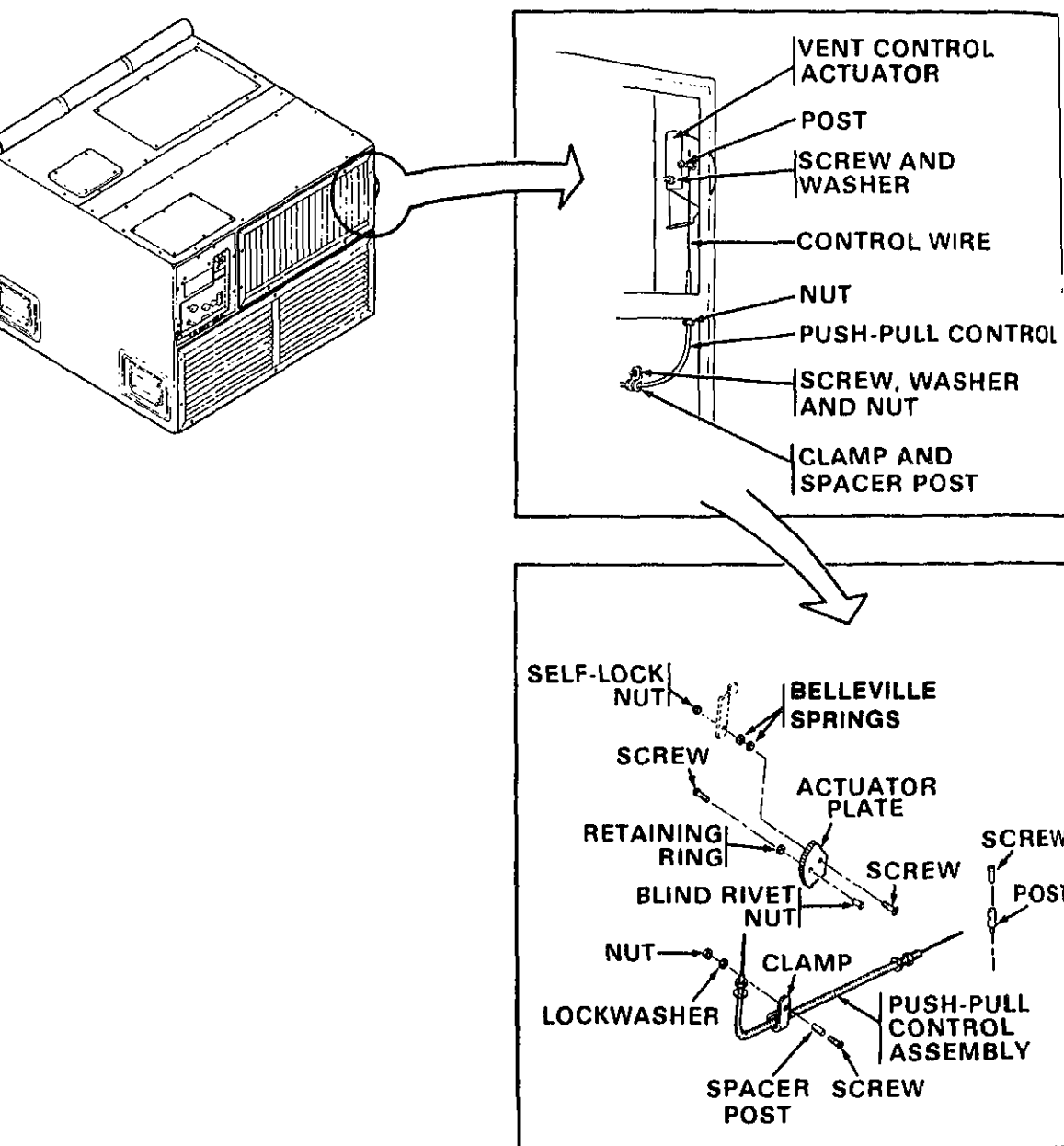
DRY CLEANING SOLVENT (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

- a. Immerse in detergent solution or dry cleaning solvent (Fed. Spec P-D-680). . . .
- b. Agitate until dirt is removed, using a soft brush if necessary to loosen caked-on dirt. . . .
- c. Rinse in clear water or clean dry cleaning solvent. . . .
- d. Drain, then hold horizontal and tap each edge on bench or floor to dislodge droplets. . . .
- a. Inspect for damage such as perforations or punctures in the screen and aluminum. . . .
- b. Inspect for areas of packed or crushed material that would obstruct airflow. . . .
- c. Check for deformation of the frame, and straighten if possible without crushing aluminum. . . .
- d. Replace if crushed, punctured, badly deformed, or broken. . . .
- e. Replace rubber insulation strip which is across top of mist eliminator, if it is torn, partly missing, missing, or damaged. . . .

CTION

LATION

- a. TOP mark must be up and airflow arrows must point outward away from coil. . . .



A0121

TM5-4120-387-142

Figure 5-23. Fresh Air Damper Adjustment

5-21. FRESH AIR DAMPER

This task covers:

- a. Adjustment
- b. Removal
- c. Cleaning
- d. Inspection
- e. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Cleaning Cloths
Cable Lubricant

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Organizational Maintenance

LOCATION/ITEM

ACTION

REMARKS

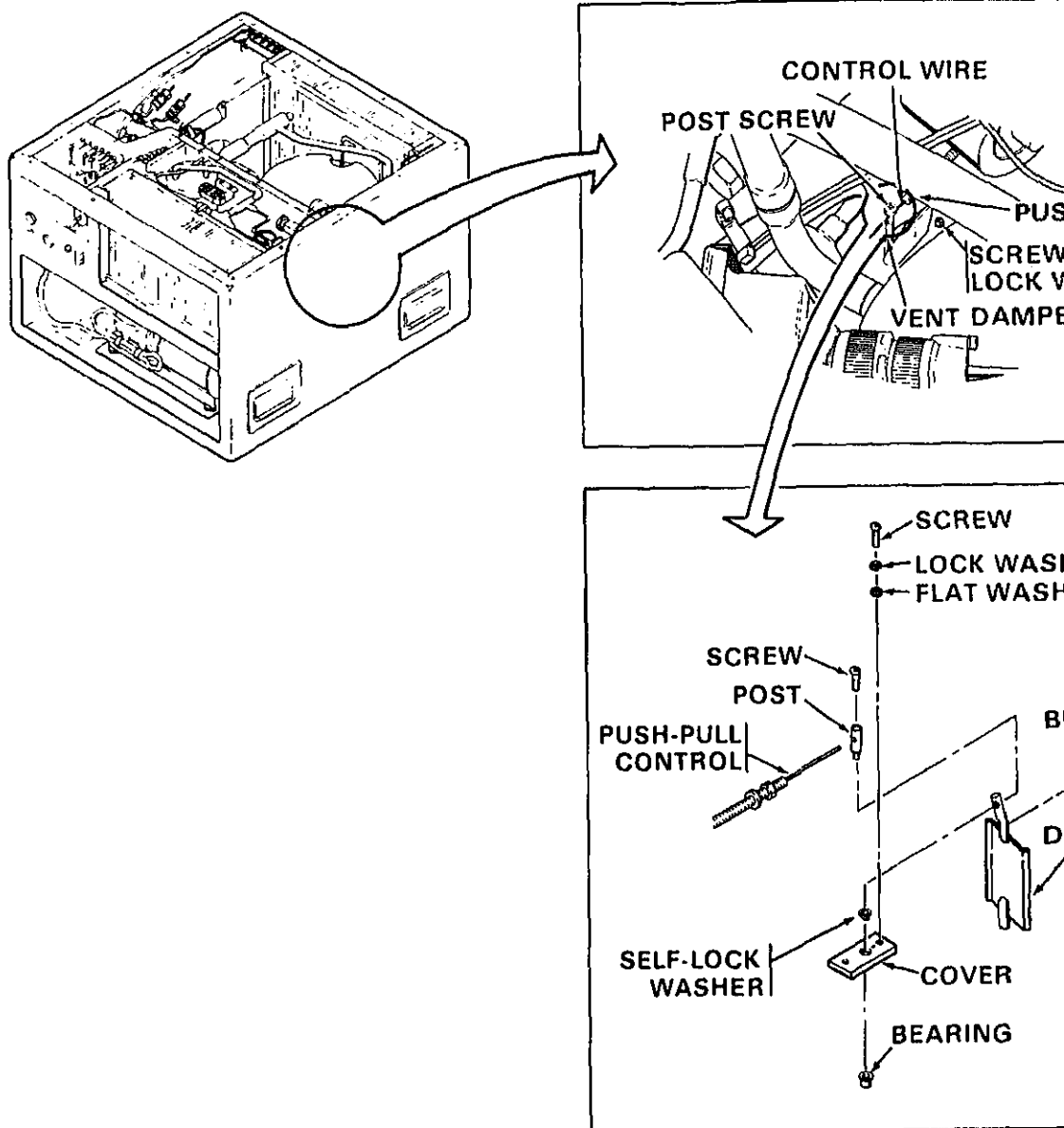
ADJUSTMENT

NOTE

Damper opens and closes fresh air inlet passage. It is opened and closed by a push-pull type control. Unit was designed for use with CBR.

- a. Loosen screw on mechanical post.

NOTE



TM5

Figure 5-24. Vent Damper

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Remove condenser top cover.	. . .
	b. Loosen screw on mechanical post and disconnect push-pull control.	. . .
	c. Remove two screws and lock washers and lift vent damper from air conditioner.	. . .
	d. Remove both evaporator louvers.	. . .
	e. Remove screw, washer, nut, spacer and loop clamp.	. . .
	f. Loosen screw and mechanical post to free end of control wire core.	. . .
	g. Remove outer nuts from both ends of control outer casing and remove push-pull control.	. . .
	h. Remove screw, nut, two spring washers and actuator.	. . .
CLEANING	a. Wipe off all loose dirt with dry cloth.	. . .
	b. Wipe off any build-up of "caked" on dirt.	. . .
INSPECTION	a. Inspect push-pull control for smooth operation of core in casing.	. . .
	b. Inspect vent damper for bent or broken condition.	. . .
	c. Inspect for loose or damaged rubber seal or damper. Cement loose rubber or replace as required.	. . .
INSTALLATION	a. Vent Control Actuator. Install actuator, screw, two spring washers and nut.	. . .
	b. Vent Damper. Install vent damper in opening in housing.	. . .
	c. Secure vent damper cover to housing with two screws and lock washers.	. . .

Figure 5-25. Fresh Air Screen

LOCATION/ITEM	ACTION	REMARKS
	f. Tighten outer nuts on casing.	. . .
	g. Install clamp, spacer, screw, nut and washer.	. . .
	h. Refer to paragraph 5-21 ADJUSTMENT to adjust the control.	. . .
	i. Install housing covers.	. . .
	j. Install evaporator inlet and outlet louvers.	. . .

5-22. FRESH AIR SCREEN

This task covers:

- a. Removal
- b. Cleaning
- c. Inspection
- d. Installation

INITIAL SETUPSpecial Environmental ConditionsApplicable Configurations

None

All

General Safety InstructionsTest Equipment

See WARNING page

None

References

Special Tools

None

None

Troubleshooting References

Materials/Parts

None

Solvent PD 680

Detergent solution

Cleaning Cloths

Container to hold solvent

and screen.

Personnel Required

Organizational Maintenance

Component Descriptions

Power OFF

Installed in shelter

LOCATION/ITEM

ACTION

REMARKS

NOTE

The fresh air screen mounted on the rear wall of the housing, covers the fresh air inlet opening to prevent air borne matter from entering the air conditioner. This unit was designed for use with CBR.

REMOVAL

a. Remove screws, lock washers.

. . .

b. Pull screen from unit.

. . .

WARNING

Dry cleaning solvent (Fed. Spec P-D-680) used to clean parts is potentially dangerous to personnel and property.

CLEANING

CLEANING

Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

a. Immerse the screen in detergent solution or dry cleaning solvent (Fed Spec P-D-680).

. . .

b. Agitate until dirt is removed, using a soft brush if necessary to loosen caked-on-dirt.

. . .

d. Replace if crushed, punctured, badly deformed, or broken.

INSTALLATION

a. Bolt screen to frame using two screws and washers.

5-23. CONDENSATE LINES

This task covers:

- a. Flow test
- b. Cleaning
- c. Removal
- d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

One pint container
Fresh Water
Brush or soft wire

Personnel Required

Organizational Maintenance

Equipment Descriptions

Power OFF
Installed in Shelter

Special Environmental Conditions

None

General Safety Instructions

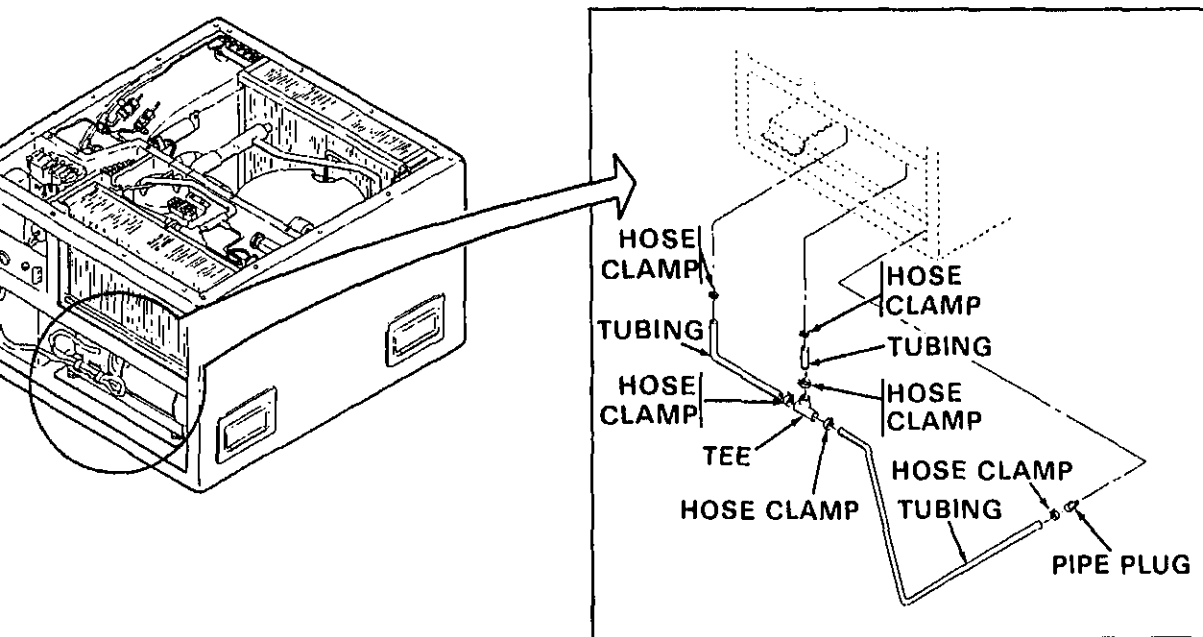
See WARNING page

References

None

Troubleshooting References

None



A01278
TM5-4120-367-14-28

Figure 5-26. Condensate Lines

LOCATION/ITEM	ACTION	REMARKS
TEST	a. Remove mist eliminator.	Paragraph 5-20
	b. Remove air filter.	Paragraph 5-19
	c. Loosen mount bolts.	. . .
	d. Place a 3/4-inch board under one side of the air conditioner to tilt it slightly.	. . .
	e. Pour about one pint (one-half liter) of water into the lower end of the drip pan below the evaporator coil.	. . .
TEST	f. Verify that the water flows out of the drip pan through the drain tube.	. . .
	g. Tilt the air conditioner the opposite direction, and repeat the flow test on the other side.	. . .

LOCATION/ITEM	ACTION	REMARKS
CLEANING	a. Flush out tubing using fresh clean water.	. . .
	b. Use a small diameter brush or a piece of soft wire to clean tubing. If necessary remove tubing in order to clean.	. . .
REMOVAL	a. Remove hose clamps.	. . .
	b. Pull tubing from unit.	. . .
INSTALLATION	a. Slide hose clamp onto tubing.	. . .
	b. Push tubing into place.	. . .
	c. Tighten hose clamp.	. . .

5-24. EVAPORATOR COIL CLEANING

This task covers:

- a. Cleaning

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Vacuum Cleaner
Brush
Safety glasses

Equipment Description

Power OFF
Installed in shelter

Special Environmental Con

None

General Safety Instruction

See WARNING page

References

None

Troubleshooting Reference

None

CLEANING

WARNING

Do not use steam to clean the coil. Live hot steam will splash and could cause burns. The high heat could cause high system pressure.

Wear safety glasses or goggles when cleaning the coil. Dirt can be blown into your eyes.

NOTE

At same time evaporator coil is cleaned the condenser coil should be cleaned.

- a. Disconnect the power supply. . . .
- b. Remove the top cover. . . .
- c. Remove the mist eliminator. Paragraph 5-20
- d. Remove the conditioned air outlet louver. . . .
- e. Cover the evaporator blower to prevent dirt from entering the blower and motor. . . .
- f. Clean the front and back surfaces using a soft bristle brush. . . .

WARNING

Use compressed air at 30 psi (1.36 kg) or less. Hold compressed air nozzle at least 6 to 8 inches away from coil to keep the compressed air from damaging the coil or fins.

- g. Use a vacuum cleaner and compressed air if necessary to clean the area between the fins. . . .
- h. Clean the air filter. Paragraph 5-19
- i. Clean the mist eliminator. Paragraph 5-20

5-25. CONDENSER COIL CLEANING

This task covers:

- a. Cleaning

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brush
Safety glasses
Compressed air and air lines
Vacuum cleaner

Personnel Required

Refrigeration specialist

Equipment Descriptions

Power OFF
Installed in shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

WARNING

WARNING

Do not use steam to clean the coil. Live hot steam will splash and could cause serious burns. Also pressure could be too high and could cause coil damage.

Wear safety glasses or goggles when cleaning the coil. Dirt could be blown into your eyes.

NOTE

At the same time the condenser coil is cleaned, the evaporator coil should be cleaned.

- a. Disconnect the power supply. . . .
- b. Remove the condenser section top cover. . . .
- c. Cover the condenser fan and motor and compressor. . . .
- d. Remove the condenser guard. . . .
- e. Clean the front and back surfaces using a soft bristle brush. . . .

WARNING

Use compressed air at 30 psi (1.36 kg) or less. Hold compressed air nozzle at least 6 to 8 inches away from coil to keep the compressed air from damaging the coils or fins.

- f. Use a vacuum cleaner and if necessary compressed air to clean the area between the fins. . . .
- g. Use a vacuum cleaner to clean the condenser motor and fan and compressor. . . .
- h. Replace all covers. . . .
- i. Connect power supply. . . .

All

Special Environmental Conditions

Test Equipment

None

None

General Safety Instructions

Special Tools

See WARNING page

None

References

Materials/Parts

None

Heat-shrink tubing

Solder

Ty-rap

Hot air dryer

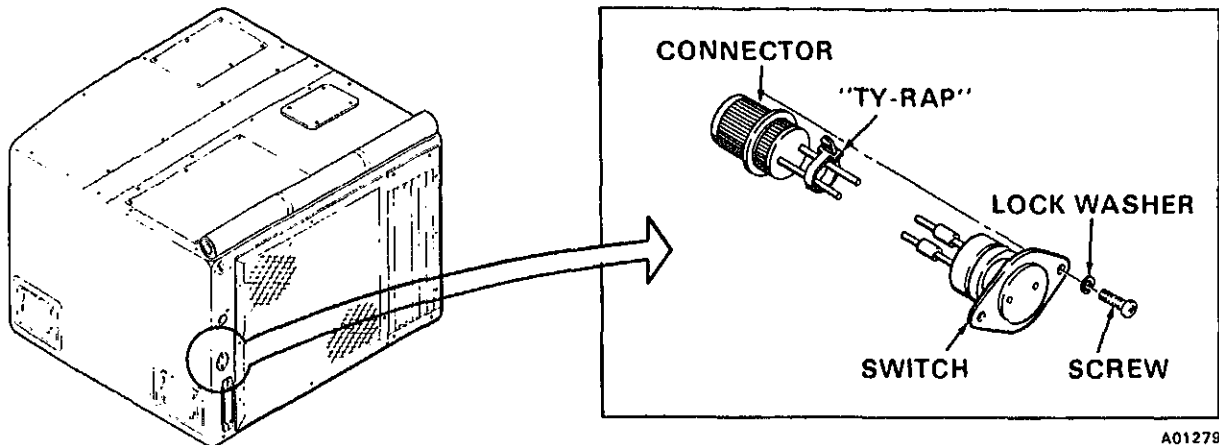
Troubleshooting References

None

Personnel Required

Refrigeration specialist

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect power supply.	WARNING High voltage can kill.
	b. Remove condenser section top cover.	....
	c. Cut "ty-rap" from plug P7 wires.	....
	d. Disconnect plug P7.	....
	e. Remove two screws and washers.	....
	f. Pull switch away from frame.	....
	g. Unsolder or cut wires at switch.	....
TESTING	See Table 4-3.	....

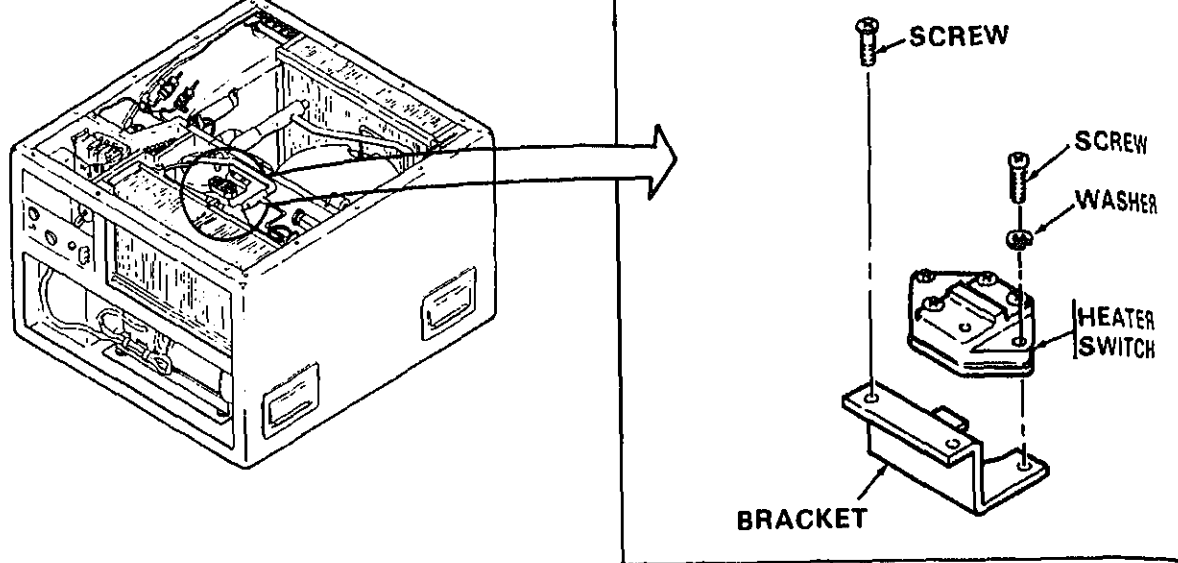


A01279

TM6 4120-367-14-27

Figure S-27. Fan Switch

LOCATION/ITEM	ACTION			REMARKS
INSTALLATION	a. Slip heat-shrink tubing over the two leads.			....
	WIRE NO.	SWITCH TERM NO.	PLUG TERM	....
	V9B20	2	A	
	V5D20	1	B	
	b. Pull tubing over solder joint.			....
	c. Hot air dry tubing.			....
	d. Push switch into frame.			....
	e. Secure with two screws and washers.			....
	f. Connect plug P7.			....
	i. Secure wires to cable with "ty-rap".			....
	j. Replace top cover.			....
	k. Connect power supply.			....



AC:28
TMB 4120-387-13

Figure 5-28. Heater Thermostat

5-27 HEATER THERMOSTAT (OVERHEAT SAFETY)

This task covers:

- Removal
- Testing
- Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting Reference

WARNING

Allow heaters to cool before attempting removal or test of heater thermostat.

REMOVAL

- a. Remove power supply. . . .
- b. Remove evaporator section top cover. . . .
- c. Remove thermostat from bracket. . . .
- d. Tag and remove wires from switch. . . .

TESTING

Refer to Table 4-3, step 12. . . .

INSTALLATION

- a. Attach thermostat to bracket. . . .
- b. Connect wires. . . .

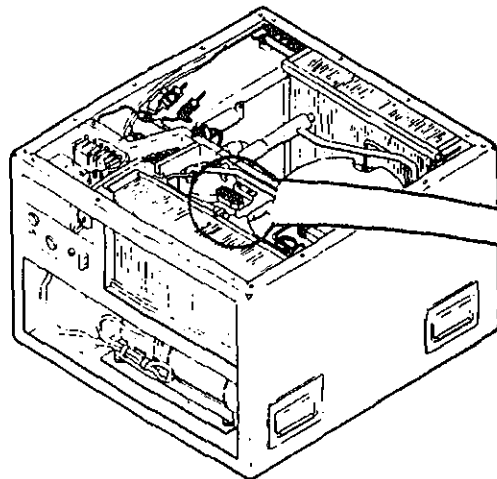
Single Phase Model F18H

WIRE NO.	TERMINAL NO.
X46A16V	1
X44A16V, X45A16V	2
X31B16V	3
X44A16V	4

3 Phase Model F18H-3 & F18H-4

X49A16B	1
X50A16C, X47A16A	2
X48A16A	3
X47A16A	4

- c. If thermostat bracket was loosened or removed, reattach to center cover. . . .
- d. Install cover. . . .
- e. Install air conditioner. Paragraph 3-5.



NOTE

Units manufactured prior to 1983 may be equipped with nylon type insulator grommets. These grommets **must** be removed and heater end support should be replaced with new part (97403) 13226F5916.

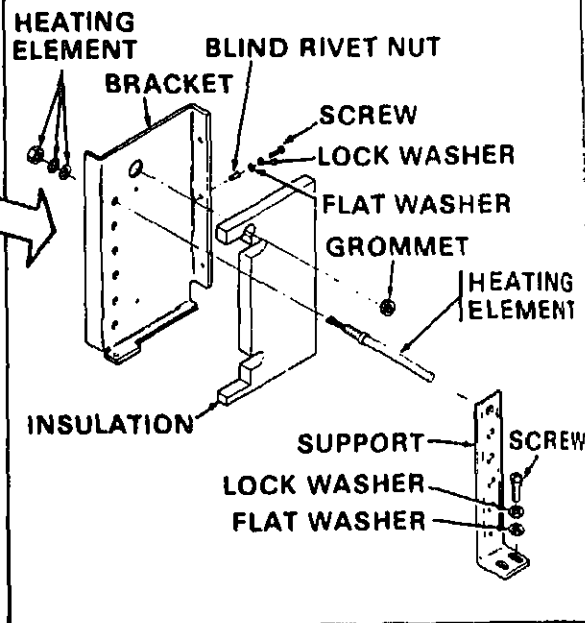


Figure 5-29. Heater

5-28. HEATER

This task covers

- a. Removal
- b. Cleaning
- c. Testing
- d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Multimeter

Special Tools

None

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

/ITEM	ACTION	REMARKS
	WARNING	
	High voltage can kill.	
	WARNING	
	Allow heater to cool before handling, severe burns can result from touching hot heater.	
		NOTE
		Model F18H has six 230 volt heaters; Models F18H-3 and F18H-4 have six 120 volt heaters.
a.	Remove power supply.	. . .
b.	Remove air conditioner from shelter.	Paragraph 3-5.
c.	Remove all three top covers.	. . .
d.	Remove heater thermostat from middle cover.	Do not remove leads.
e.	Remove heater support.	. . .
f.	Remove four screws.	. . .
g.	Remove nut from top heater. Allow it to slide onto heater terminal.	. . .
h.	Pull top heater from heater bracket.	Heater lead will only allow slight movement of heater.
i.	Pull heater bracket up and out of air conditioner until top heater lead can be tagged. Remove lead from terminal board.	Use caution, 2nd heater from top will prevent movement of bracket when heater touches refrigerant piping.
j.	Remove each of remaining five heaters in same manner as first was removed.	. . .

WARNING

Allow heaters to cool before handling.

CAUTION

TESTING

Refer to Table 3-7, step 14.

INSTALLATION

- a. Position heater bracket into frame so that heaters can be installed one at a time.

Single Phase Model F18H

WIRE NO.	HEATER	TB2
X46D16V	HR1-1	5
X18C16V	HR1-2	1
X46E16V	HR3-1	5
X18F16V	HR3-2	2
X46B16V	HR5-1	7
X18E16V	HR5-2	2
X45D16V	HR2-1	6
X32D16V	HR2-2	3
X45E16V	HR4-1	6
X32E16V	HR4-2	3
X46B16V	HR6-1	8
X32B16V	HR6-2	4

3 Phase Models F18H-3 & F18H-4

WIRE NO.	HEATER	TB2
X52A16C	HR1-1	7
X19C16C	HR1-2	1
X54A16B	HR3-1	8
X18C16B	HR3-2	2
X56A16A	HR5-1	9
X17C16A	HR5-2	3
X55A16C	HR2-1	7
X59B16C	HR2-2	4
X53A16B	HR4-1	8
X60B16B	HR4-2	5
X51A16A	HR6-1	9
X39B16A	HR6-2	6

- b. Install one heater at a time and slide bracket down after each heater is installed.
- c. Slip nut, lockwasher, and insulating washer over heater leads before leads are connected to terminal board TB2.
- d. Insert heaters in bracket and support.
- e. Install and tighten bracket.

CHAPTER 6

DIRECT AND GENERAL SUPPORT MAINTENANCE

PRESSURE TEST

ask covers;

a. Pressure test refrigerant system.

L SETUP

able Configurations

Special Environmental Conditions

None

General Safety Instructions

quipment

See WARNING page

ne

References

al Tools

None

ne

Troubleshooting References

rials/Parts

None

arging Manifold

ety glasses

Personnel Required

oment Descriptions

Direct support

wer OFF

talled in shelter

LOCATION/ITEM

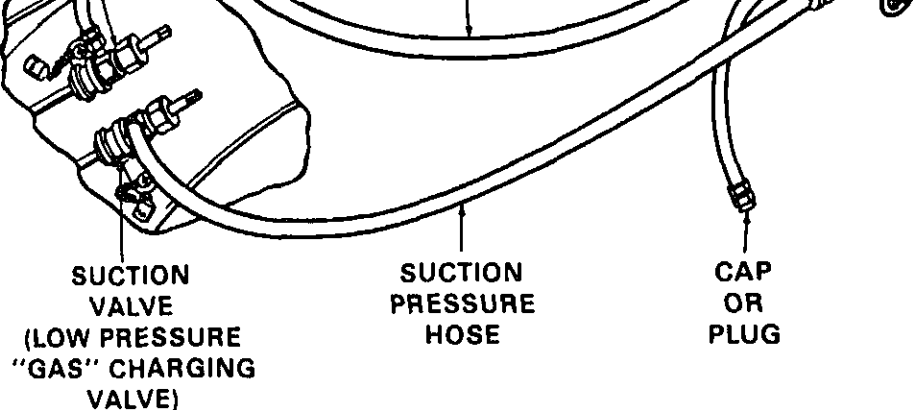
ACTION

REMARKS

DENSER SECTION RGING VALVES.

a. Remove charging valve access panel.

. . .



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Figure 6-1. Pressure Test

LOCATION/ITEM	ACTION	REMARKS
SET UP	<p>d. Make sure that the fresh air damper is completely closed, and that the evaporator air intake and discharge grilles are fully open.</p> <p>e. Hang an accurate thermometer directly in front of the evaporator air intake grille to register "dry bulb return air to unit" temperature.</p> <p>f. Hang an accurate thermometer directly in front of the condenser coil guard, making sure that the thermometer is shaded from direct sunlight, to record "outdoor ambient temperature."</p> <p>g. If indoor ambient temperature is too low, provide a space heater to raise the "dry bulb return air to unit" temperature to 80°F (27°C)</p>	<p>. . .</p> <p>. . .</p> <p>. . .</p> <p>. . .</p>

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

PROCEDURE

- Turn the MODE switch to COOL, and the temperature SELECTOR switch to maximum COOLER. . . .
- Slowly open the charging valves to which pressure gauges have been connected. . . .
- Let the air conditioner operate for at least 15 minutes in the cooling mode, so that all parts of the system are stabilized. . . .
- Record the temperatures indicated by both thermometers and the pressure indicated by both pressure gauges. . . .
- Compare the readings obtained from pressure testing with the normal ranges shown in Table 6 -1. . . .

ANALYSIS OF DISCREPANCIES

- If actual pressure-temperature relationships differ from those shown in Table 6-1, take appropriate action. . . .
 - If pressures are too low: See Table 6-3 and 6-4. . . .
 - If pressures are too high: See Table 6-3. . . .
 - If discharge pressure is extremely high and suction pressure is extremely low, blockage may exist in the refrigeration system. Troubleshoot, correct the trouble, recharge if necessary, and repeat the pressure test. . . .

COMPLETION

- After pressure testing has been successfully completed, close the suction and discharge service valves. . . .
- Drain the pressure from the charging manifold and hose very slowly by cracking the hose on the suction and discharge service valves. . . .

Table 6-1 NORMAL TEMPERATURE - PRESSURE RELATIONSHIPS

95°F (35°C) dry bulb return air to unit

Outdoor ambient temperature	50°F 10°C	75°F 24°C	100°F 38°C	110°F 43.5°C	125°F 52°C
Gauge Pressures					
Suction (psig) (Kg/Cm ²)	56-60 3.93-4.22	56-65 3.93-4.57	65-75 4.57-5.27	70-80 4.92-5.62	75-90 5.27-6.33
Discharge (psig) (Kg/Cm ²)	135-155 9.50-10.90	185-205 13.00-14.41	275-295 19.33-20.74	375-380 26.36-26.72	400-420 28.12-29.53

80°F (27°C) dry bulb return air to unit

Outdoor ambient temperature	50°F 10°C	75°F 24°C	100°F 38°C	125°F 52°C
Gauge Pressures				
Suction (psig) (Kg/Cm ²)	56 min. 3.93 min.	56 min. 3.93 min.	56-65 3.93-4.57	65-75 4.57-5.27
Discharge (psig) (Kg/Cm ²)	130-150 9.14-10.55	180-200 12.65-14.06	270-290 18.98-20.39	290-410 20.39-28.82

NOTE: Dry bulb temperatures are measured with an ordinary thermometer

Table 6-2 EXCESSIVE HEAD AND SUCTION PRESSURE

POSSIBLE CAUSE	REMEDY
1. Unit overcharged	1. Purge excess refrigerant.
2. Restricted condenser air.	2. Check for free air flow. a. Check condenser louver adjustment. b. Check for any restrictions to air flow. c. Check operation actuating cylinder. d. Condenser fan or motor needs repair or replacement.
3. Air in system	3. Check for leaks on suction side; release refrigerant, check operation.

NOTE

Table 6-3 LOW HEAD PRESSURE

POSSIBLE CAUSE	REMEDY
Refrigerant charge	1. Completely charge then leak test, repair, and recharge to 5.5 lbs. (2.5 kg)
Restriction in liquid line.	2. Locate and repair.
Expansion valve leaking.	3. Replace.
Thermostat defective	4. Replace.
Compressor cylinder defective	5. Replace.

Table 6-4 LOW SUCTION PRESSURE

POSSIBLE CAUSE	REMEDY
Refrigerant charge.	1. Completely charge then leak test, repair and recharge to 5.5 lbs. (2.5 kg).
Restriction in expansion valve.	2. Repair or replace.
Evaporator air flow	3. Restriction, dirty filter, dirty mist eliminator, motor or blower.
Ambient at or near 0° (-18°C)	4. It will be necessary to jumper LPCO to operate at this outdoor temperature.

6-2. LEAK TEST

This task covers:

- a. Leak test of refrigerant system.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Electronic Leak Detector

Special Tools

None

Materials/Parts

Safety glasses
Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Thermal gloves.
Charging manifold
Nitrogen cylinder

Equipment Descriptions

Power ON
Installed in or removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

Operating Instructions for Le

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

TUBING, JOINTS,
COMPONENTS

NOTE

d. Watch for bubbles.

e. Mark point at which leak is found.

f. Wipe solution from all joints.

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.

WARNING

Disconnect power.

CAUTION

The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft-free area.

- a. Position refrigerant drum so that only refrigerant gas will be used and connect to center hose of charging manifold.
- b. Remove caps from both charging valves and loosely connect hose from charging manifold to valves. Purge air from lines and tighten hoses on valves.
- c. Open both charging valves and allow refrigerant to flow into system until gauges indicate 50 PSIG (3.5 Kg/CM²).

- g. Connect nitrogen regulator to center connection on charging manifold.
- h. Open nitrogen regulator valve slowly.
- i. Open discharge service valve and suction service valve. *Do not turn on air conditioner.*
- j. Slowly open both valves on charging manifold & charge system to 350 PSIG (22Kg/Cm²).
- k. Close *all* valves.

NOTE

Tester must be calibrated for a pure refrigerant leak rate of 0.1 ounce (2.84 g) per year.

- l. Turn on electronic leak detector & slowly pass probe around all points in the system where a leak could exist.
- m. Depending upon the type of detector used, a leak will be indicated by an audible signal, a light, or by meter deflections.
- n. When leak is found, mark leak point.
- o. Disconnect hose between charging manifold and nitrogen regulator.
- p. Open manifold valves.

WARNING

Discharge refrigerant in an open area and *not* around an open flame.

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

CAUTION

Discharge the system *slowly* to reduce oil loss from compressor.

- | | |
|---|-------|
| q. Using refrigeration wrench, <i>slowly</i> open <i>LOW SIDE</i> valve to allow refrigerant gas to flow slowly out of hose. | . . . |
| r. Using refrigeration wrench, <i>slowly</i> open <i>HIGH SIDE</i> valve to allow refrigerant gas to flow slowly out of hose. | . . . |
| s. Close both service valves when gas stops flowly out of hose. | . . . |

3. REPAIR

This task covers general information needed by a technician to repair this unit.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

NOTE

The following instructions are provided for use by refrigeration shops furnished with only the most basic equipment. If more sophisticated equipment, such as two-valve or four-valve service manifolds are available, they should be used by making appropriate modifications to these instructions.

OPENING SYSTEM

- a. When the refrigeration system must undergo maintenance that requires the system to be opened for removal of parts, the system must first be discharged and purged.

Paragraphs 6-4 and 6-5.

- b. After the repair has been made and all soldering completed, the system must be charged and tested for leaks.

Paragraph 6-7 or 6-8 and 6-2

REMOVAL OF PARTS

- a. It may be necessary to remove some tubing and fittings with a part that is to be replaced. . . .
- b. The tubing and fittings can then be removed from the defective part and installed in the new part. . . .
- c. Care should be exercised in opening joints or resoldering to prevent damage to other parts of the air conditioner. . . .

NOTE

If soldering is necessary on any part of the system, a constant purge of dry nitrogen must be fed through the system being soldered to prevent scale formation within the system.

BRAZING

- a. Braze copper to copper joints with silver solder Grade III, IV or VI specifications QQ-B-654 and copper to brass or copper to steel with Grade IV, or VI specifications QQ-B-654 per MIL-B-7883. . . .

- b. Solder melting point is 1160°F (626°C)

LOCATION/ITEM	ACTION	REMARKS
INSULATION AND GASKETS	a. Replace damaged insulation and gaskets.	. . .
	b. Cement loose insulation.	. . .
SCREWWARE	a. Replace any damaged screws, washers, lock washers or nuts.	. . .
	b. Use screws of correct length to hold parts securely.	. . .
	c. In some applications screws that are too long may bottom before the head is tight against part it is to hold or may cause damage to the threads or other parts.	. . .
DEBRAZING	a. With dry nitrogen flowing through the system, debraze tubing connections at any fitting near the compressor that will permit convenient removal.	. . .
	b. Tubing and fittings attached to the compressor after its removal can be transferred to the replacement compressor before installation in the air conditioner.	. . .
SHIMS	a. Be sure to remove all shims where used.	. . .
	b. Keep shims together and identify them as to location.	. . .
REPAIRING DAMAGED THREADS	a. Damaged threads should be repaired by use of a thread restorer or by chasing in a lathe.	. . .
	b. Internal threads should be repaired with a tap of the correct size.	. . .
	c. If threads cannot be satisfactorily repaired, replace the part.	. . .
REPAIR OF DAMAGED MACHINED AND POLISHED SURFACES	a. Smooth rough spots, scores, burrs, galling, and gouges from damaged machined and polished surfaces so that part will effi-	. . .

highly polished surfaces.

c. On these surfaces, buffing or the use of crocus cloth is recommended.

TUBES AND FITTINGS

a. Check tubes and fittings for cracked or split condition.

b. Check tubing for kinks.

c. Replace defective fittings.

d. Replace damaged tubing with tubing of same size.

e. Take care in making bends in tubing to prevent kinking of tubing.

f. All tubing and fittings must be completely clean on inside prior to installation.

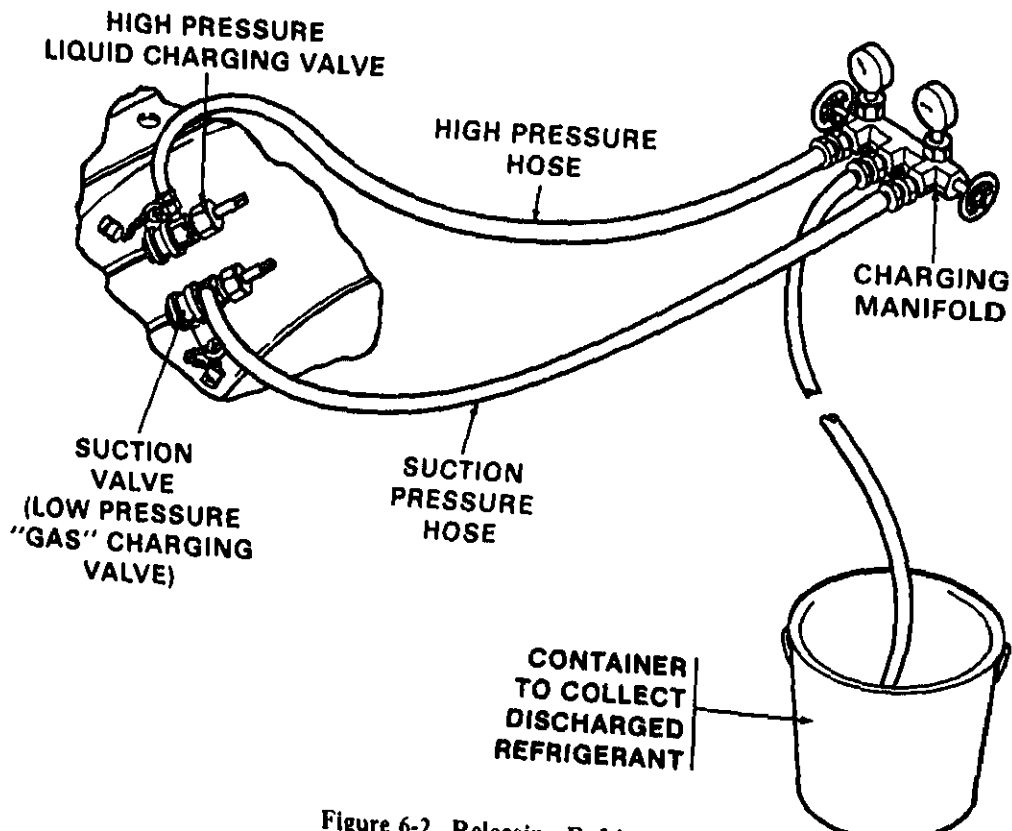


Figure 6-2. Releasing

RELEASING REFRIGERANT

Work covers the procedure for releasing refrigerant.

SETUP

Equipment Configurations

Equipment

Tools

Tools/Parts

Refrigerating Manifold
Safety glasses
Cleaning cloths
(Paragraph 3-1)
Thermal gloves
Refrigerant container

Equipment Descriptions

Turn OFF
Refrigerant moved from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

DANGER

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face pro-

WARNING

Avoid contact with refrigerant being discharged from compressor burnout.
Acid in refrigerant can cause burns.

CAUTION

To prevent excessive loss of compressor oil, release system, slowly over a period of two hours.

DISCHARGE

- a. Remove caps from charging valves. . . .
- b. Connect charging manifold to charging valves. . . .
- c. Attach hose assembly end to manifold center connection and place other end in a container. . . .
- d. Open manifold valves. . . .

WARNING

Discharge refrigerant in an open area and *not* around an open flame.

CAUTION

Discharge the system *slowly* to reduce oil loss from compressor.

- e. Using refrigeration wrench, *slowly* open *LOW SIDE* valve to allow refrigerant gas to flow slowly out of hose. . . .
- f. Using refrigeration wrench, *slowly* open *HIGH SIDE* valve to allow refrigerant gas to flow slowly out of hose. . . .
- g. Close both service valves when gas stops flowing out of hose. . . .

NITROGEN PURGE

sk covers the nitrogen purge procedure.

SETUP

able Configurations

Special Environmental Conditions

None

quipment

General Safety Instructions

See WARNING page

l Tools

References

None

als/Parts

Troubleshooting References

None

arging Manifold
ety glasses
ogen (cylinder)
s (Paragraph 3-1)
mal gloves

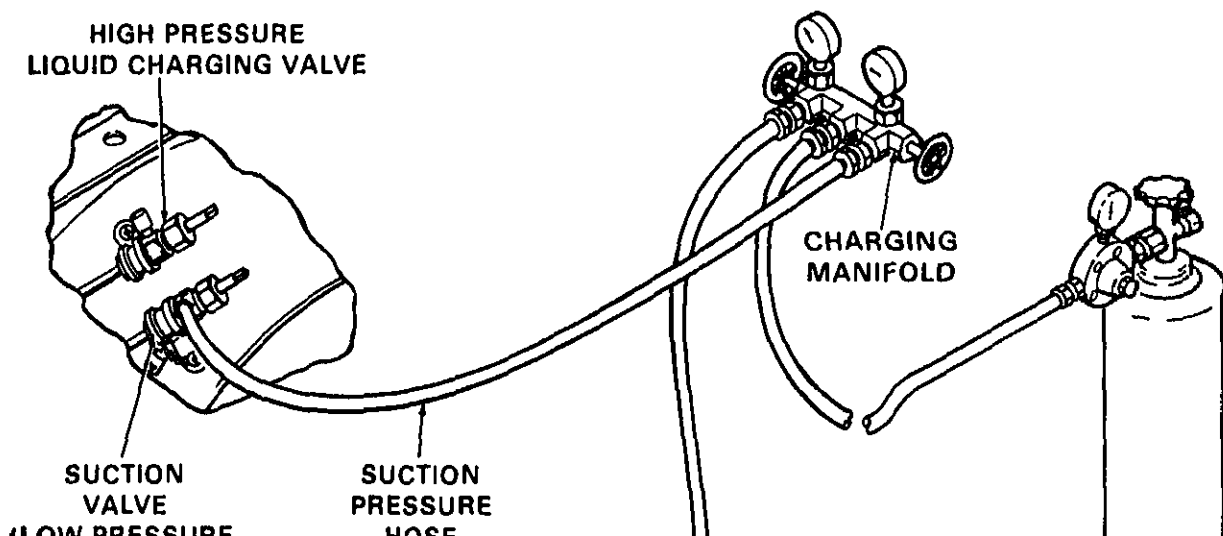
Personnel Required

Direct support

ment Descriptions

er OFF
oved from shelter

LOCATION/ITEM	ACTION	REMARKS
PURGE	a. Release refrigerant charge.	Paragraph 6-4
	CAUTION Nitrogen pressure in the system should not exceed 10 pounds.	
	b. Attach middle hose from charging manifold to dry nitrogen cylinder valve.	. . .
	c. Connect hose from charging manifold low side to suction charging valve.	. . .
	d. Open both charging valves.	. . .
	e. Open cylinder valve and allow dry nitrogen to flow through system until all moisture is forced out. (Not less than 5 minutes).	. . .
	f. Close cylinder valve.	. . .
	g. Close both charging valves.	. . .
	h. Disconnect all hoses.	. . .



EVACUATION

task covers connecting a vacuum pump to remove all contamination from the refrigerant piping.

AL SETUP

able Configurations

Equipment

ne

al Tools

ne

rials/Parts

arging Manifold
afety glasses
ols (Paragraph 3-1)
vacuum pump

ment Descriptions

wer OFF
moved from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

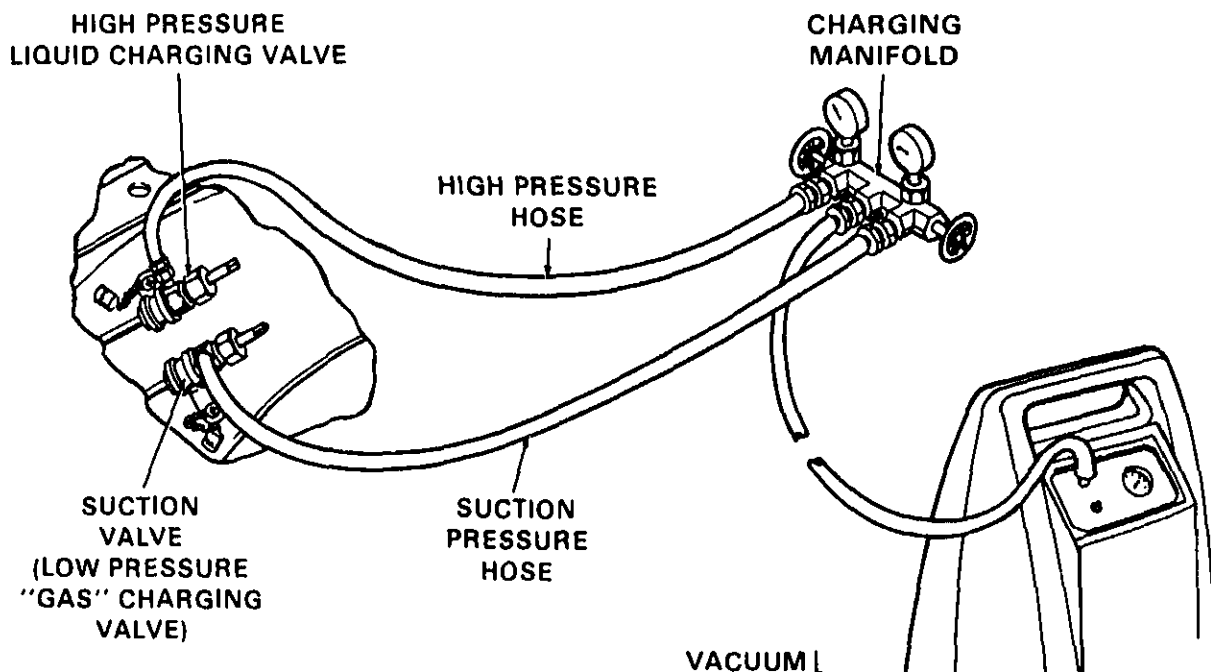
ACTION

REMARKS

VACUUM PUMP

- | | |
|--|----------------|
| a. Leak test system. | Paragraph 6-1. |
| b. Install new filter/dryer. | Paragraph 6-15 |
| c. Close charging manifold valves. | . . . |
| d. Remove caps from charging valves. | . . . |
| e. Attach manifold hoses to the charging valves. | . . . |

LOCATION/ITEM	ACTION	REMARKS
VACUUM PUMP	i. Open both charging valves.	. . . .
	j. Run the vacuum pump until at least 29 inches of mercury, measured on the vacuum pump gauge is reached.	. . . .
<p style="text-align: center;">NOTE</p> <p>Inability to reach 29 inches of mercury may indicate a leak <i>or</i> problem with pump.</p>		
	k. Continue running the pump for 1 more hour, observing the vacuum pump gauge. If the gauge needle moves back and forth, there is a refrigerant leak which must be located and corrected.	. . . .
	l. Close manifold valves.	. . . .
	m. Close both charging valves.	. . . .
	n. Stop vacuum pump.	. . . .



REFRIGERANT CHARGING WITH GAS

This task covers procedures to add refrigerant gas to a system which is low on refrigerant.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold

Safety glasses

Cleaning cloths

Refrigerant R22

Tools (Paragraph 3-1)

Thermal gloves

Equipment Descriptions

Power OFF

Installed or removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

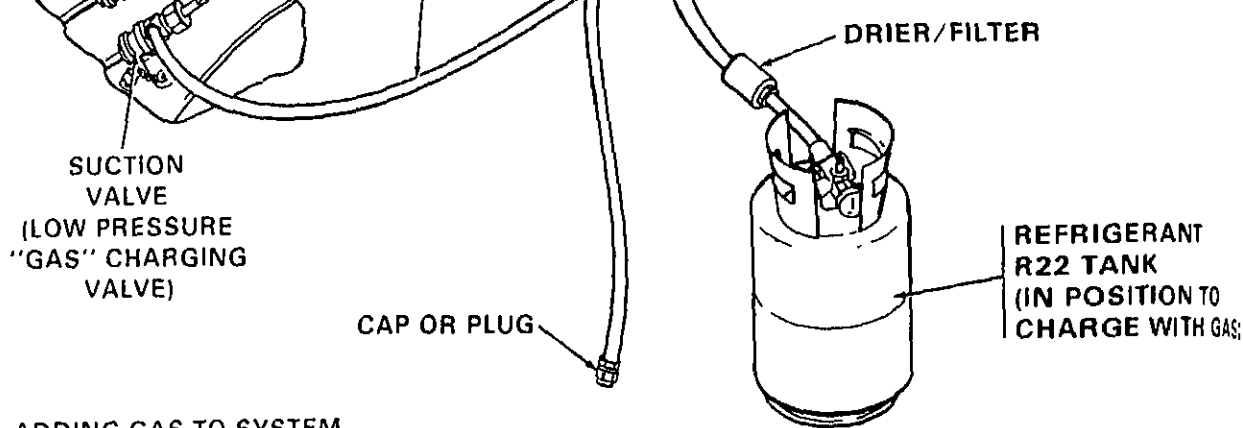
ACTION

REMARKS

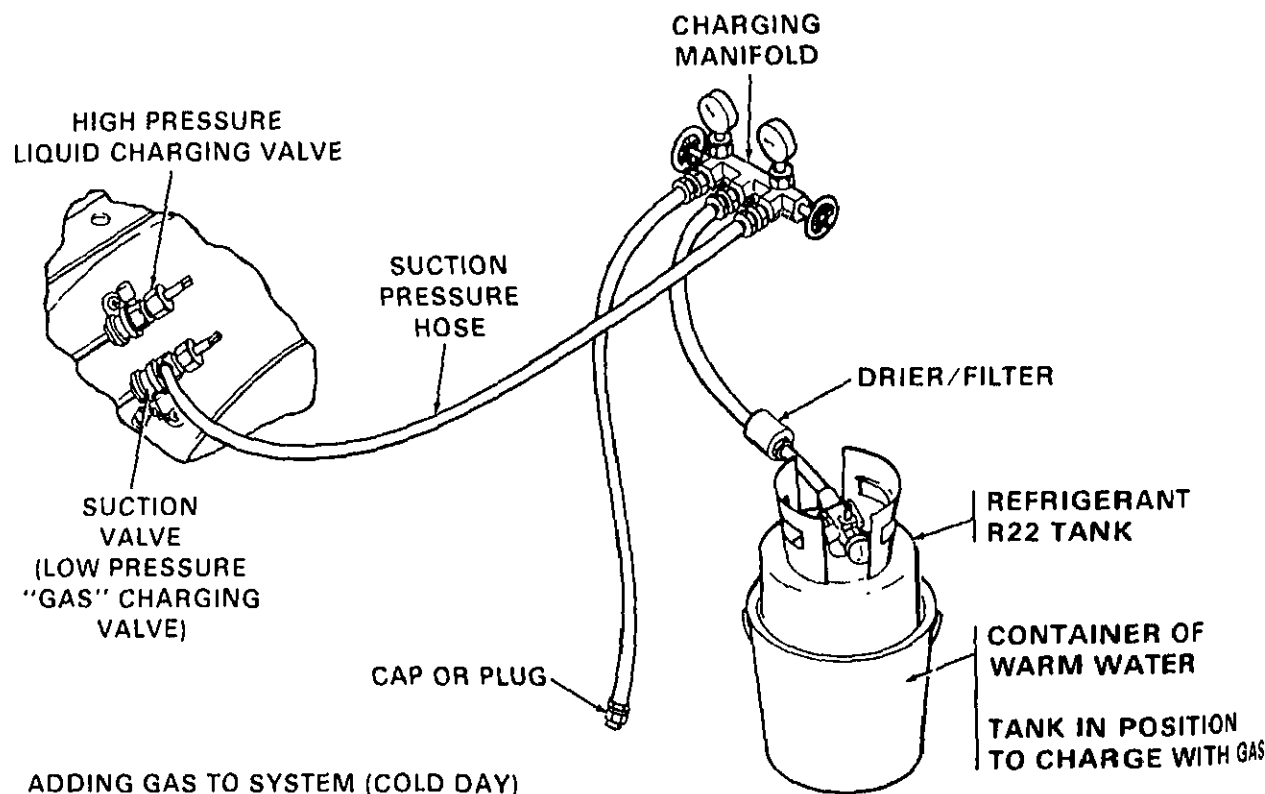
CHARGING

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where liquid refrigerant is being discharged.



ADDING GAS TO SYSTEM



ADDING GAS TO SYSTEM (COLD DAY)

Figure 6-5. Refrigerant Charging, Gas

CHARGING

CAUTION

Do not attempt to charge liquid refrigerant into the suction line. The compressor would be damaged.

CAUTION

If compressor knocking or pounding is heard when charging with gas, shut down at once and release some refrigerant.

NOTE

Two kinds of refrigerant drums are in general use. One is equipped with a single shutoff valve, and must be inverted when charging liquid refrigerant. The other is equipped with a vapor valve and a liquid valve, which makes it possible to charge either liquid or vapor when the drum is upright.

- a. Place refrigerant drum in upright position.

CAUTION

When adding refrigerant, use extreme care to avoid adding refrigerant to the system too fast which would cause slugging at the compressor.

- b. Remove cap from low pressure (suction side) charging valve and loosely connect charging line to valve. Purge air from line.
- c. Open refrigerant drum valve slightly to purge air from charging line. Tighten connection at charging valve. Close refrigerant drum valve.
- d. With the air conditioner operating slowly admit gas to system.
- e. Close valves and carefully loosen the charging line to release trapped pressure. Disconnect charging line and install charging valve cap. Operate air conditioner in cooling mode for 15 minutes.

6-8. REFRIGERANT CHARGING WITH LIQUID

This task covers procedures to add liquid refrigerant to a discharged system.

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Cleaning cloths
Refrigerant R22 (5.5 lbs. 2.5 Kg)
Tools (Paragraph 3-1)
Thermal gloves

Equipment Descriptions

Power OFF
Removed from Shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

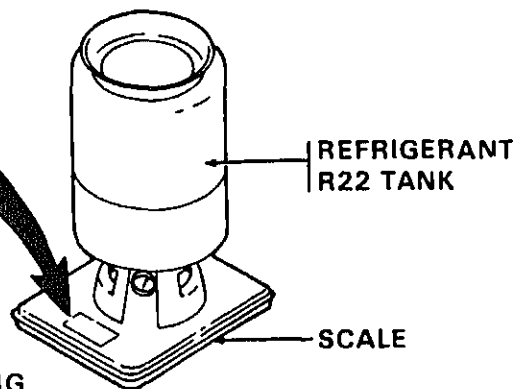
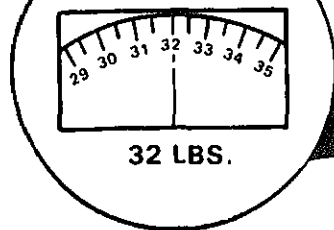
LOCATION/ITEM

ACTION

REMARKS

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation.



WEIGHT TANK BEFORE CHARGING

HIGH PRESSURE
LIQUID CHARGING VALVE

CHARGING
MAINFOLD

HIGH PRESSURE
HOSE

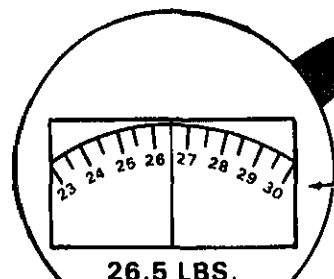
DRIER/FILTER

SUCTION
VALVE
(LOW PRESSURE
"GAS" CHARGING
VALVE)

CAP OR PLUG

REFRIGERANT
R22 TANK
IN POSITION TO
CHARGE LIQUID

SCALE



AFTER
SCALE
READING

NOTE

Two kinds of refrigerant drums are in general use. One is equipped with a single shut-off valve, and must be inverted when charging liquid refrigerant. The other is equipped with a vapor valve and a liquid valve which makes it possible to charge either liquid or vapor when the drum is upright.

NOTE

Whenever the refrigerant system has been opened, a new filter-drier must be installed before re-charging.

CHARGING

- | | |
|--|----------------|
| a. Evacuate the system. | Paragraph 6-6. |
| b. Use only R22 refrigerant. | . . . |
| c. Set drum with valve down on scale. | . . . |
| d. Record the weight. | . . . |
| e. Subtract 5.5 lbs (2.5 kg) and mark dial face at that point. | . . . |
| f. Connect charging manifold to drum. | . . . |
| g. Connect charging manifold to high (head) pressure valve. | . . . |
| h. Open refrigerant tank valve slightly and loosen hose fitting for a few seconds at manifold to purge hose. | . . . |
| i. Tighten fitting at the manifold. | . . . |
| j. Open high side valve. | . . . |
| k. Open tank valve until tank weight has decreased by 5.5 pounds. (2.5 kg) | . . . |
| l. Immediately close HIGH SIDE service valve, manifold valve and refrigerant | . . . |

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

CHARGING

- | | | |
|----|--|-------|
| n. | Check liquid sight indicator. If system is short of refrigerant, gas bubbles will appear regularly in the indicator. | . . . |
| o. | If refrigerant system is undercharged, add additional refrigerant...see paragraph 6-7. | . . . |

COMPRESSOR

s task covers

- a. Safety Measures
- b. Diagnosing Compressor Motor Burnout
- c. Cleaning after burnout

INITIAL SETUP

Applicable Configurations

All

Test Equipment

Acid test kit

Special Tools

None

Materials/Parts

Brazing Flux
 Brazing Alloy
 Charging Manifold
 Safety glasses
 Brazing and Soldering Set
 Solvent PD680
 Detergent Solution
 Cleaning cloths
 Refrigerant R22
 Nitrogen

Equipment Descriptions

Power OFF
 Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

SAFETY MEASURES

- a. Serviceman should be aware of acid burns.
- b. When testing for odor, release a small amount of gas and smell it cautiously to avoid inhalation of toxic decomposed products.
- c. When discharging gas or liquid refrigerant from a burnout, avoid eye-or-skin-contact with the product.
- d. If the entire charge is to be removed, it should be discharged outside any enclosure.
- e. Do not discharge refrigerant near an open flame.
- f. Wear rubber gloves to avoid acid burns when handling sludge from a burned out compressor.

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.

CAUTION

The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft-free area.

DIAGNOSING
COMPRESSOR
OR BURNOUT

- c. These problems must be corrected or avoided to prevent repetition of the burnout. . . .
- d. A compressor motor that fails to start may be due to improper voltage, a faulted motor thermal switch (S8)), a malfunction of the compressor start relay, or a compressor mechanical fault. . . .
- e. Make certain that a burnout has occurred by doing the following: . . .
- (1) Check for proper voltage. . . .
 - (2) Remove power connector from unit. . . .
 - (3) Check S8 for full continuity between pins D and E on motor plug P-4. . . .
 - (4) Check power at compressor connector by jumping pins D and E. . . .
 - (5) Remove the compressor leads at the compressor side of the start relay. . . .
 - (6) Close the disconnect switch to energize the control circuit. . . .
 - (7) Check for voltage on all lines at both the line and load side of the compressor relay K3. . . .

NOTE

Before checking the compressor motor, make sure the compressor and crankcase heater are cool to the touch. Otherwise, a false indication may be obtained due to internal motor protectors being open.

- (8) Check the compressor motor to see if it is electrically grounded or open. . . .
 - (9) A 500 volt megger or an ohmmeter can be used for making the test. . . .
 - (10) Megger reading is at least 5 megohms. . . .
- f. After removal of a bad compressor from the refrigeration system, remove all external

SAFETY MEASURES

- a. Serviceman should be aware of acid burns.
- b. When testing for odor, release a small amount of gas and smell it cautiously to avoid inhalation of toxic decomposed products.
- c. When discharging gas or liquid refrigerant from a burnout, avoid eye-or-skin-contact with the product.
- d. If the entire charge is to be removed, it should be discharged outside any enclosure.
- e. Do not discharge refrigerant near an open flame.
- f. Wear rubber gloves to avoid acid burns when handling sludge from a burned out compressor.

WARNING

Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from any container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or safety glasses in any situation where skin-or-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas.

CAUTION

The electronic leak detector is sensitive to the presence of refrigerant gas in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but draft-free area.

DIAGNOSING
COMPRESSOR
MOTOR BURNOUT

- | | |
|--|-------|
| c. These problems must be corrected or avoided to prevent repetition of the burnout. | . . . |
| d. A compressor motor that fails to start may be due to improper voltage, a faulted motor thermal switch (S8)), a malfunction of the compressor start relay, or a compressor mechanical fault. | . . . |
| e. Make certain that a burnout has occurred by doing the following: | . . . |
| (1) Check for proper voltage. | |
| (2) Remove power connector from unit. | . . . |
| (3) Check S8 for full continuity between pins D and E on motor plug P-4. | . . . |
| (4) Check power at compressor connector by jumping pins D and E. | . . . |
| (5) Remove the compressor leads at the compressor side of the start relay. | . . . |
| (6) Close the disconnect switch to energize the control circuit. | . . . |
| (7) Check for voltage on all lines at both the line and load side of the compressor relay K3. | . . . |

NOTE

Before checking the compressor motor, make sure the compressor and crankcase heater are cool to the touch. Otherwise, a false indication may be obtained due to internal motor protectors being open.

- | | |
|---|-------|
| (8) Check the compressor motor to see if it is electrically grounded or open. | . . . |
| (9) A 500 volt megger or an ohmmeter can be used for making the test. | . . . |
| (10) Megger reading is at least 5 megohms. | . . . |
| f. After removal of a bad compressor from the refrigeration system, remove all exter- | . . . |

- h. If the oil is black, contains sludge and has an acrid odor, the compressor failed because of motor burnout.
- i. If a burnout has occurred, the refrigeration system must be cleaned to prevent residual contaminants from causing repeated burnouts.

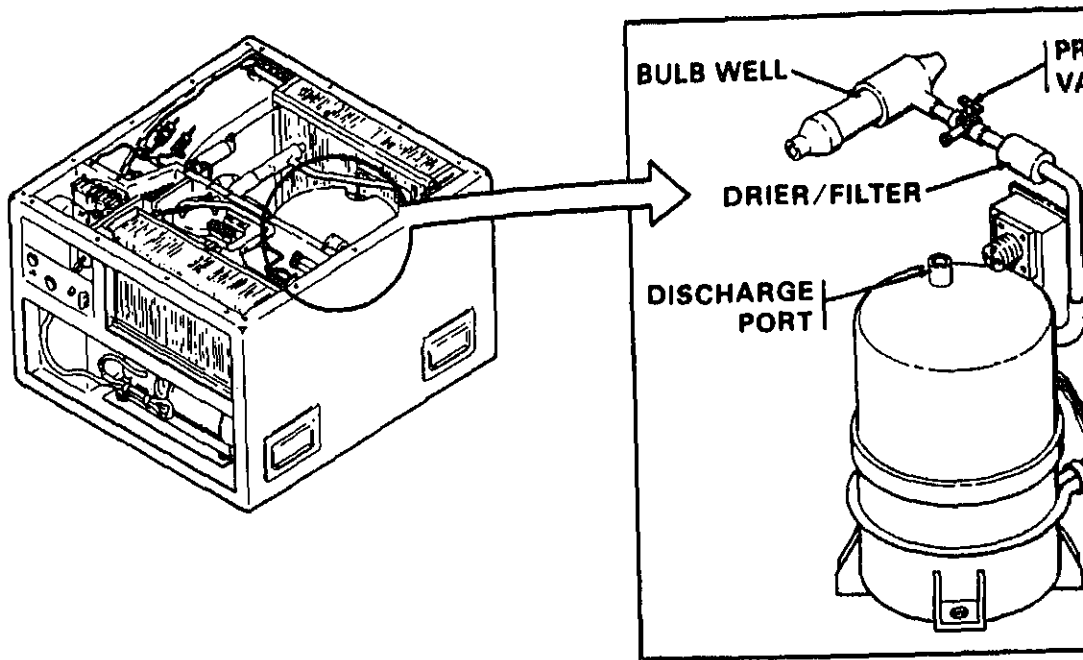


Figure 6-7. Compressor Burnout Cleanup

CLEANUP PROCEDURES

- a. System must be cleaned thoroughly to remove all contaminants.
- b. Discharge refrigerant from system.
- c. Nitrogen purge both high and low sides of system.

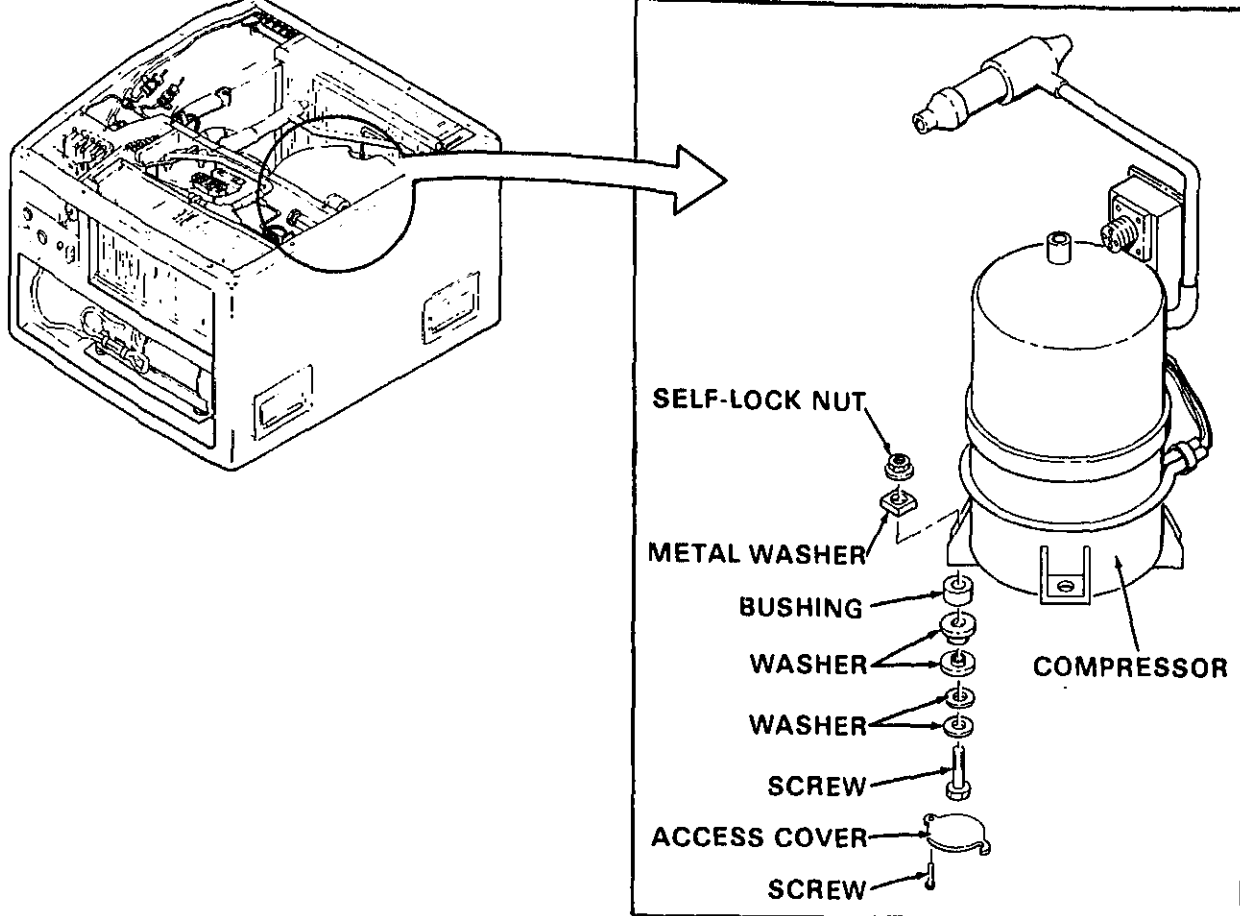
If not, a repeat burnout occur.

Paragraph 6
Wear rubber gloves

Paragraph 6

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

- | | |
|--|-----------------|
| g. Check the expansion valve and clean or replace it. | Paragraph 6-17. |
| h. Replace sight glass | Paragraph 6-14. |
| i. Remove the burned out compressor and install the replacement. | Paragraph 6-9. |



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Figure 6-8. Compressor Replacement

LOCATION/ITEM	ACTION	REMARKS
j.	Evacuate the system	Paragraph 6-6.
k.	Recharge the system and put in operation.	Paragraph 6-8.
l.	Check pressure drop across the new suction drier after one hour of operation. Change, if necessary, and evacuate system.	Between new valve and low side charging valve, no more than 3 psig difference is permitted.
m.	After 8 to 24 hours of operation, change	

LOCATION/ITEM

ACTION

REMARKS

REMOVAL

- a. Disconnect power supply.

WARNING
High voltage can kill.

- b. Remove top covers.

WARNING

Avoid contact with refrigerant. Acid burns could result from contact with refrigerant.

- c. Discharge refrigerant system.

Paragraph 6-4.

WARNING

It may be necessary to wait for crankcase heater to cool. Heater can cause severe burns.

- d. Disconnect electrical connector.

- e. Unsolder or if necessary cut tubing at the compressor.

- f. Loosen two screws in each of four access covers on bottom of air conditioner.

- g. Move four access covers to one side.

- h. Remove four sets of screws, washers, bushings, and nuts.

Save for installation. In bushing and washers. If necessary to order new installation.

WARNING

If compressor is being removed due to burnout, use care when lifting to avoid touching compressor sludge. Acid in sludge can cause burns.

- i. Lift compressor from air conditioner.

INSTALLATION

CAUTION

If compressor is being replaced due to motor burnout, decontaminate system.

Failure to follow caution result in failure of new compressor.

ACTION/ITEM	ACTION	REMARKS
-------------	--------	---------

ELIATION

- d. Install four mounting screws, flat washers, and washers and bushings.

CAUTION

Compressor solder tube connections are factory sealed to prevent moisture or dirt contamination of compressor. Do not remove plugs until compressor is to be connected to refrigerant tubing.

- e. Discard plastic plugs from compressor solder connections.

NOTE

If refrigeration piping was disconnected with the compressor being replaced, transfer the piping to the replacement compressor before installing it in the air conditioner.

- f. Lift compressor and slowly lower down onto the four sets of mounting hardware.

- g. Secure compressor in place using washers and selflocking nuts.

- h. Solder refrigerant tubing to compressor. See paragraph 6-3.

NOTE

Dry nitrogen is always used to purge the refrigeration system before brazing or debrazing connections, in order to prevent internal oxidation and scaling.

CAUTION

Do not use new compressor to draw vacuum on system.

- i. Evacuate the system

Paragraph 6-6.

- j. Connect compressor electrical connector.

- k. Charge system with 5.5 pounds (2.5 kg) of refrigerant R-22.

Paragraph 6-8.

6-10. COMPRESSOR CRANKCASE HEATER

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Cleaning cloths
Tools (Paragraph 3-1)

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

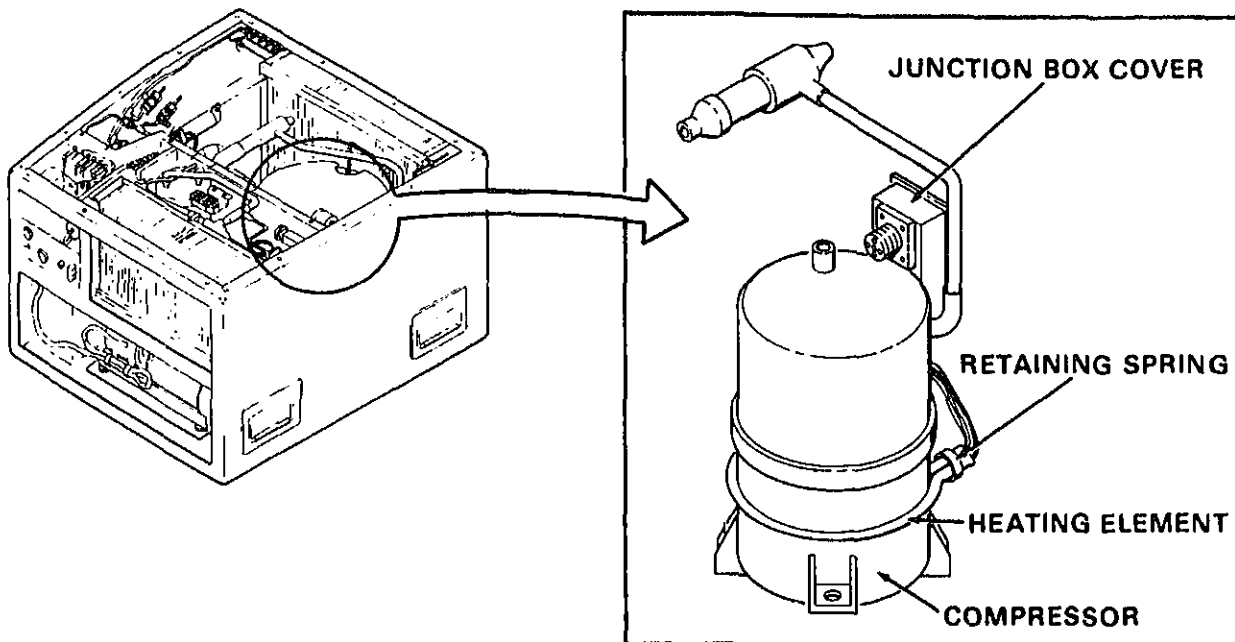
Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Discharge refrigerant	Paragraph 6-4.
	b. Disconnect power supply	WARNING High voltage can ki
	c. Remove all three top covers.	
	CAUTION Check that compressor and heater are cool. Either or both can cause severe	



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Figure 6-9. Crankcase Heater

LOCATION/ITEM

ACTION

REMARKS

NOTE

One lead is spliced to compressor switch S9 and the other lead is connected to the compressor connector.

e. Tag and unsolder wire lead from heating element. . . .

f. Spring the ends of the heating element apart slightly so that the heating element can be maneuvered around and over the top of the compressor housing to remove it. . . .

REMOVAL

- g. Use hot air dryer to shrink the tubing. . . .
- h. Install cover on junction box. . . .
- i. Connect power supply

6-11. CONDENSER COIL

This task covers: a. Cleaning b. Removal c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
 Brazing Alloy
 Charging Manifold
 Safety glasses
 Brazing and Soldering Set
 Solvent PD680
 Detergent Solution
 Cleaning cloths
 Refrigerant (cylinder)
 Nitrogen R22
 Tools (Paragraph 3-1)
 Abrasive cloth
 Scale
 Gloves

Equipment Descriptions

Power OFF
 Removed from shelter

Special Environmental Condition

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

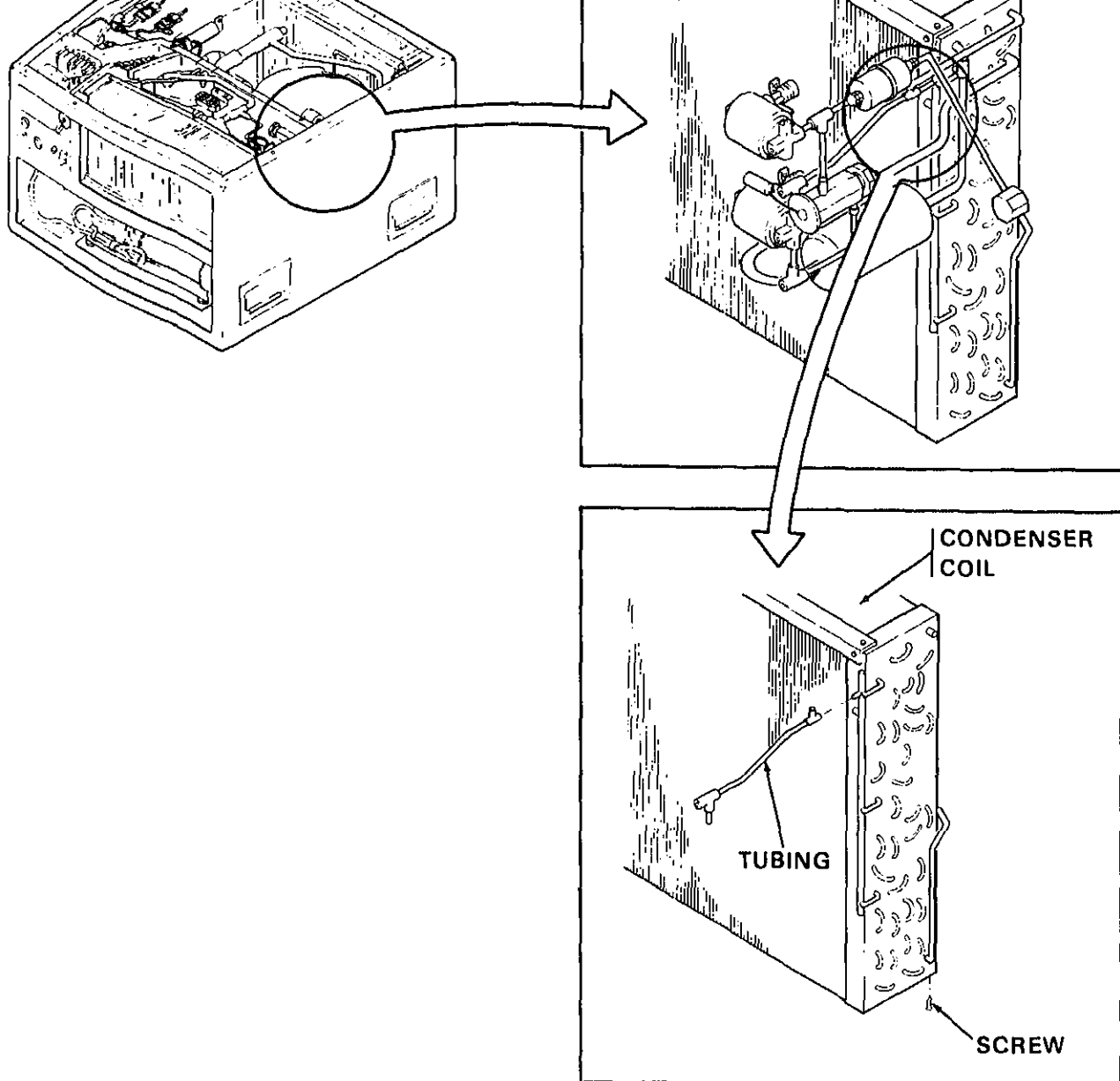


Figure 6-10. Condenser Coil

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LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

REMOVAL

- | | |
|--|----------------|
| d. Unsolder tubing at joint near condenser. | Paragraph 6-3. |
| e. Remove actuator control. | Paragraph 6-22 |
| f. Remove condenser guard. | . . . |
| g. Remove four screws that secure coil to frame. | . . . |

NOTE

Sight glass must be removed with condenser coil (See paragraph 6-13).

- | | |
|------------------------------|-------|
| h. Lift coil from the frame. | . . . |
|------------------------------|-------|

INSTALLATION

- | | |
|---|--------------------|
| a. Install new drier/filter (dehydrator) | Paragraph 6-14. |
| b. Install spring nuts on bottom of coil. | . . . |
| c. Position coil in air conditioner | . . . |
| d. Install four screws to secure coil. | . . . |
| e. Install condenser guard. | . . . |
| f. Install and adjust louver control. | Paragraph 6-23 |
| g. Solder tubing connections. | Paragraph 6-3. |
| h. Nitrogen purge system. | Paragraph 6-5. |
| i. Leak test and evacuate. | Paragraphs 6-2 and |
| j. Charge system with liquid refrigerant. | Paragraph 6-8. |
| k. Replace top covers. | . . . |

RECEIVER

ask covers:

Removal

b. Installation

AL SETUP

Cable Configurations

Equipment

ne

al Tools

ne

rials/Parts

ezing Flux
ezing Alloy
arging Manifold
ety glasses
ezing and Soldering Set
vent PD680
tergent Solution
eaning cloths
riferant R22
rogen (cylinder)
ols (Paragraph 3-1)
rasive cloth
ole
oves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

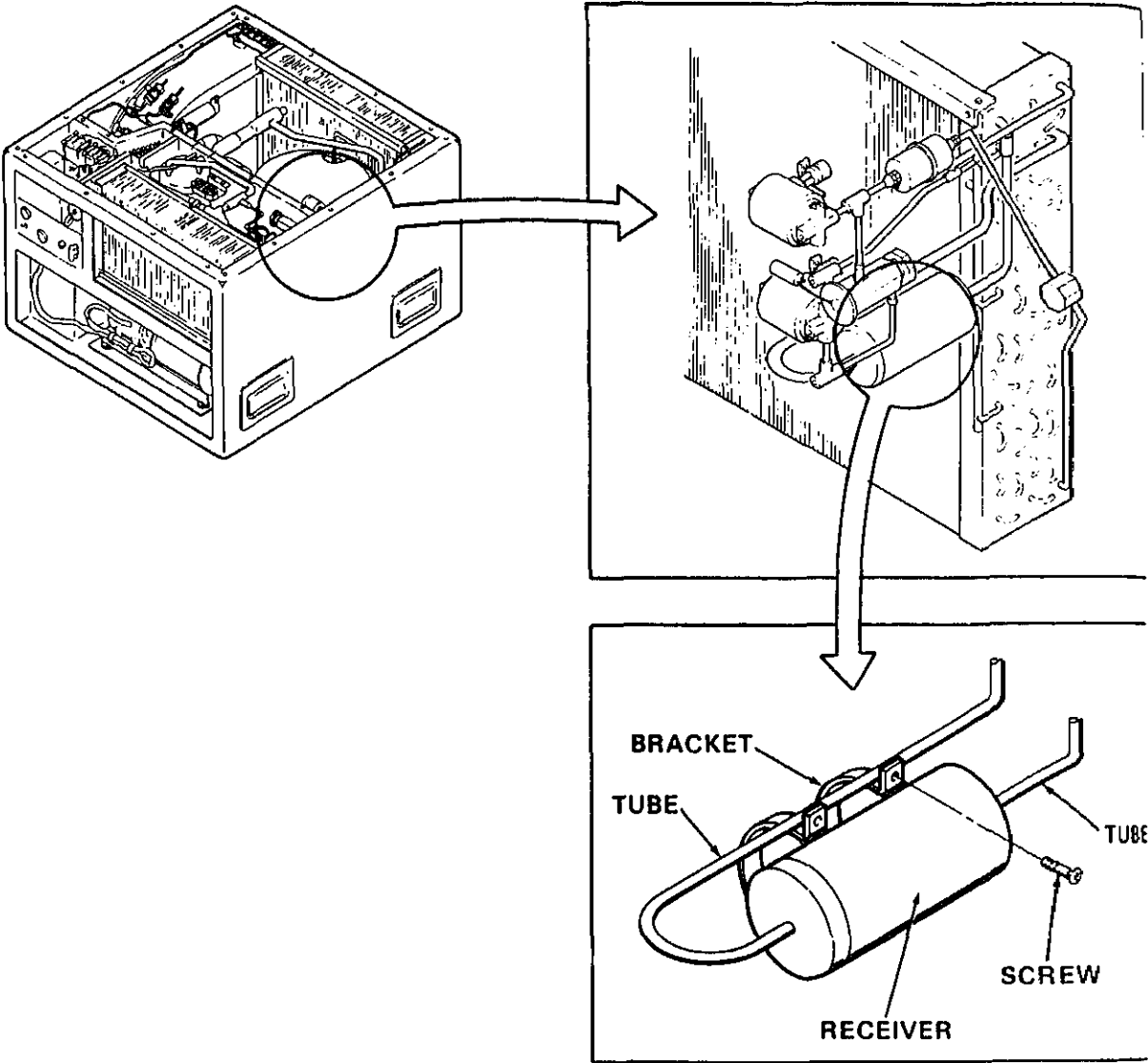
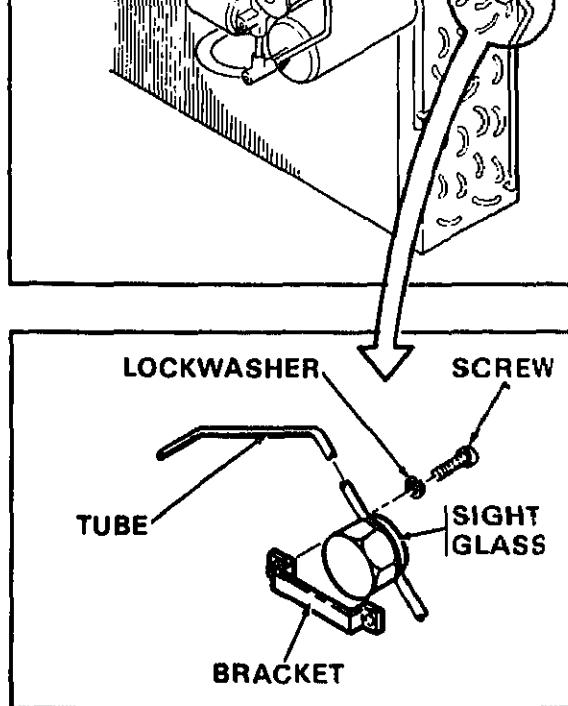
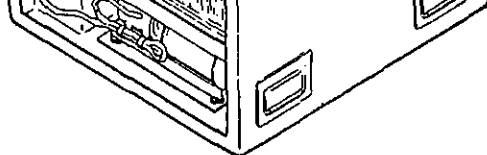


Figure 6-11. Receiver

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LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Discharge refrigerant.	Paragraph 6-4



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Figure 6-12. Sight Glass

ACTION/ITEM	ACTION	REMARKS
-------------	--------	---------

AL

- | | |
|---|-----------------|
| a. Discharge refrigerant. | Paragraph 6-4. |
| b. Remove top covers. | . . . |
| c. Remove connector on inside of unit from input power connector J11. | . . . |
| d. Remove two screws and lockwashers. | . . . |
| e. Remove mounting bracket from inside housing. | . . . |
| f. Remove condenser coil and sight glass as an assembly. | Paragraph 6-11. |
| g. Unsolder sight glass from tubing. | Paragraph 6-3. |

ACTION

- | | |
|---|-------------------------|
| a. Install new drier/filter (dehydrator). | Paragraph 6-14. |
| b. Solder sight glass to condenser. | Paragraph 6-3. |
| c. Install condenser coil. | Paragraph 6-11. |
| d. Place bracket over sight glass on inside of housing. | . . . |
| e. Secure bracket with two screws and lockwashers. | . . . |
| f. Nitrogen purge system. | Paragraph 6-4. |
| g. Leak test and evacuate. | Paragraphs 6-2 and 6-6. |
| h. Charge system with liquid refrigerant. | Paragraph 6-8 |
| i. Replace covers. | . . . |

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

6-14. DRIER/FILTER (DEHYDRATOR)

This task covers:

- a. Removal
- b. Cleaning
- c. Inspection
- d. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Charging Manifold
- Safety glasses
- Solvent PD680
- Detergent Solution
- Cleaning cloths
- Refrigerant R22
- Nitrogen (cylinder)
- Tools (Paragraph 3-1)
- Scale
- Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

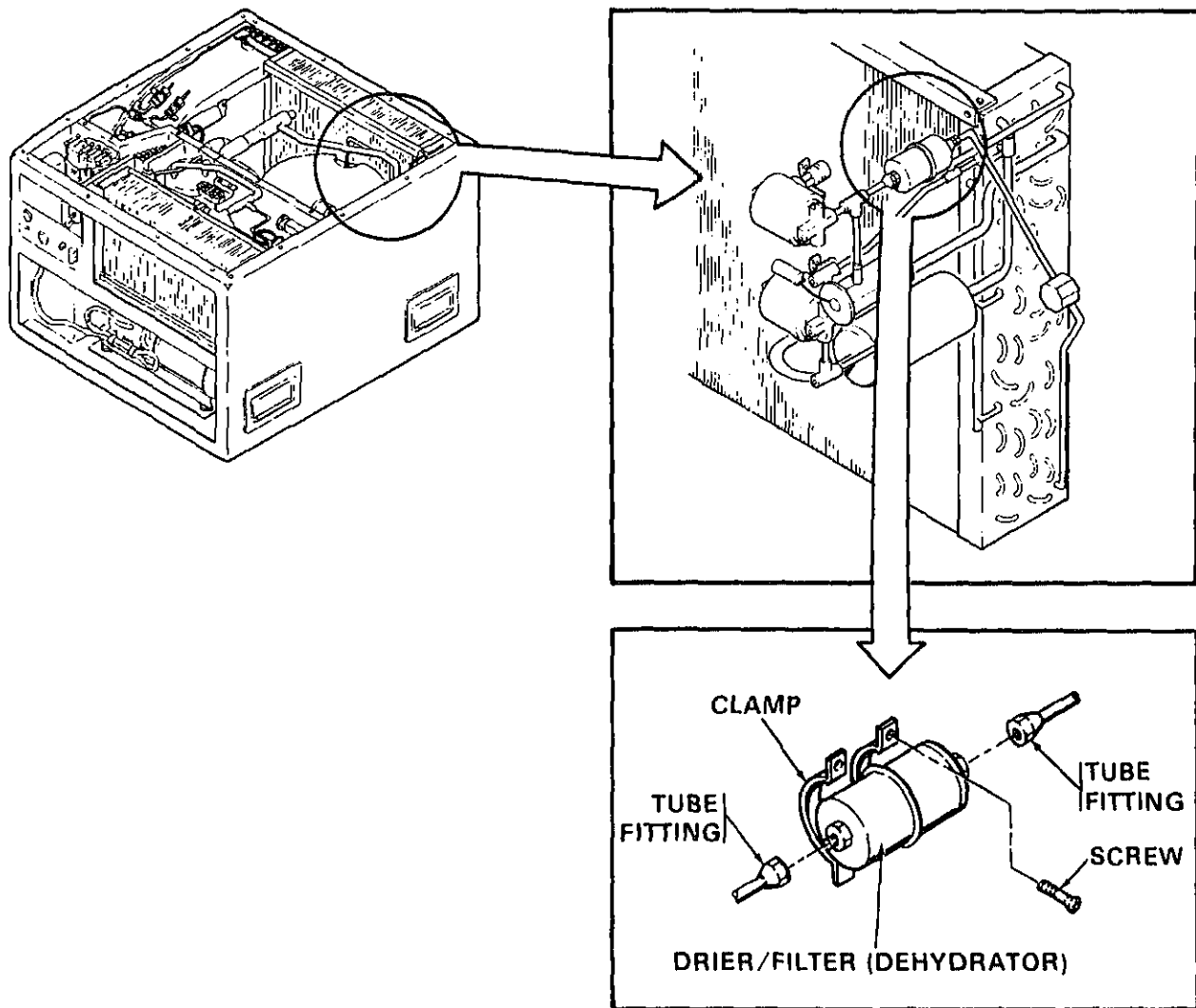
Direct support

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

REMOVAL

- a. Discharge refrigerant
- b. Remove top covers

Paragraph 6-4



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Figure 6-13. Drier/Filter

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Nitrogen purge system	Paragraph 6-4
	b. Connect drier to tubing	

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

NOTE

Replaceable parts are the coil, b
assembly, diaphragm and preformed pa

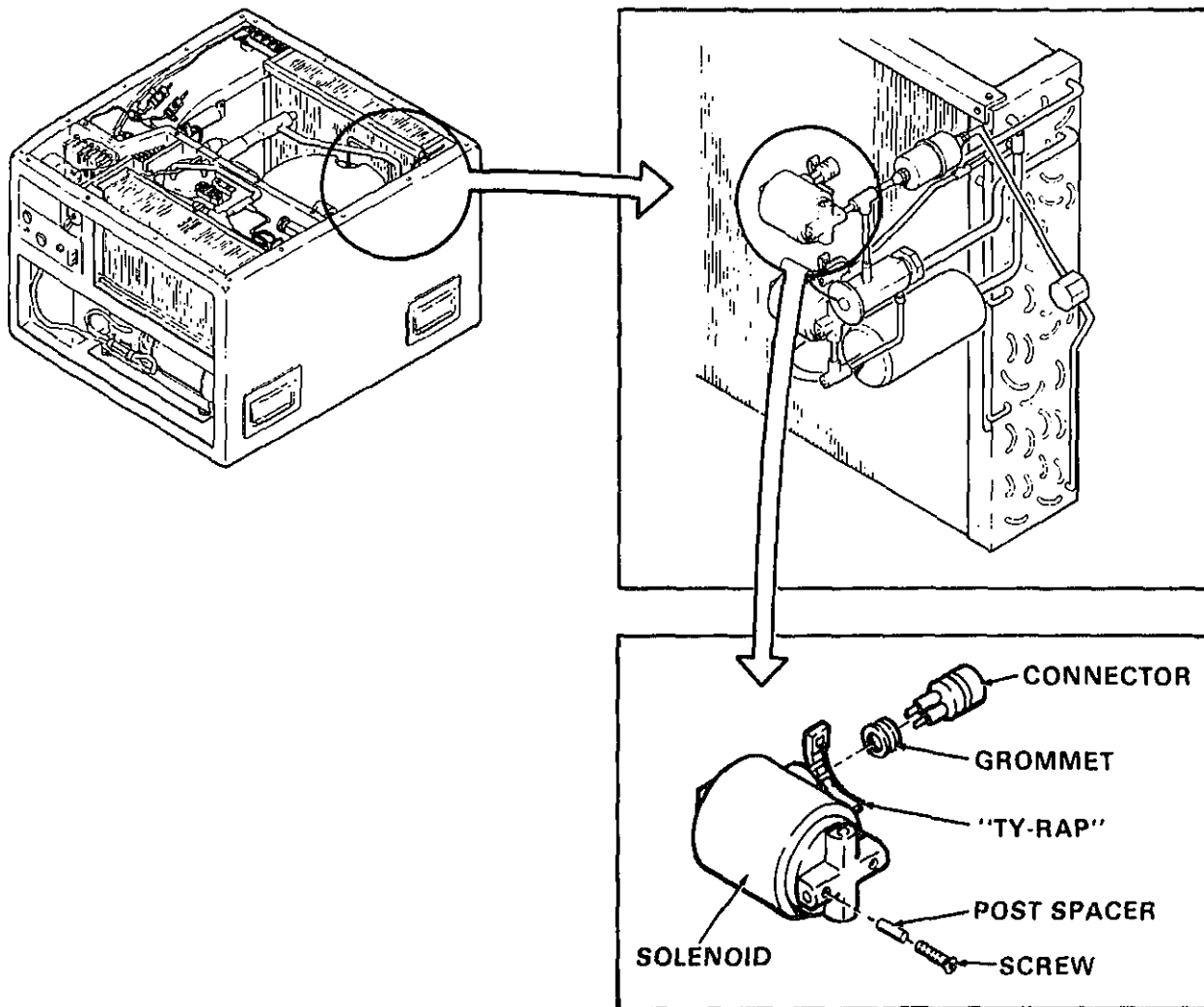


Figure 6-14. Solenoid Valve

NOTE

Removal, disassembly, cleaning, and inspection are the same for both solenoid valves.

- b. Remove electrical connector from solenoid valve leads.
- c. Remove nut on top of valve housing.
- d. Lift data plate and coil assembly from body tube and plunger assembly.

WARNING

System under pressure. Do not remove tube and plunger assembly.

- e. Install new coil assembly, data plate, and nut.
- f. Connect electric wiring.

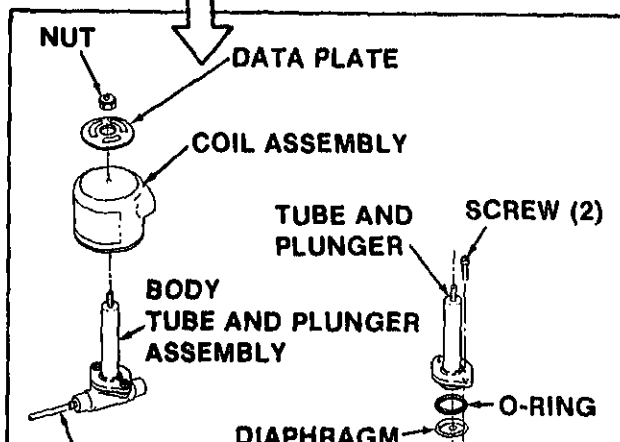
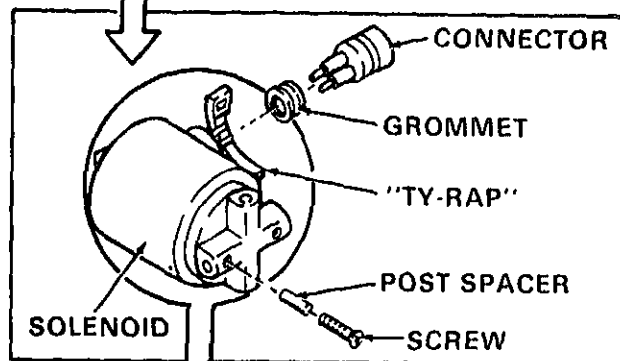
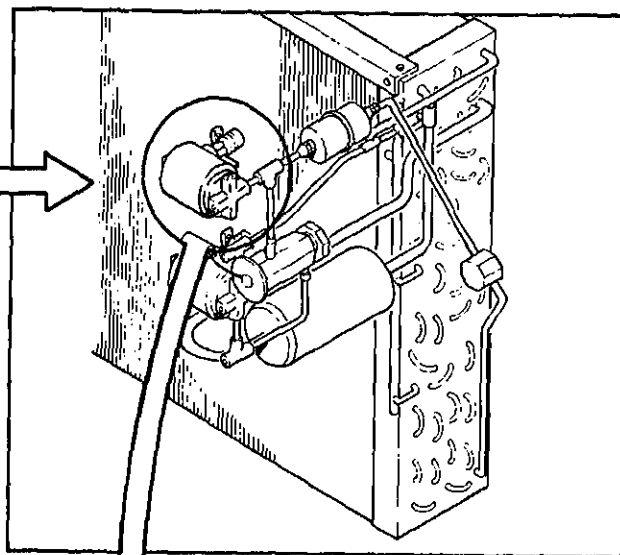
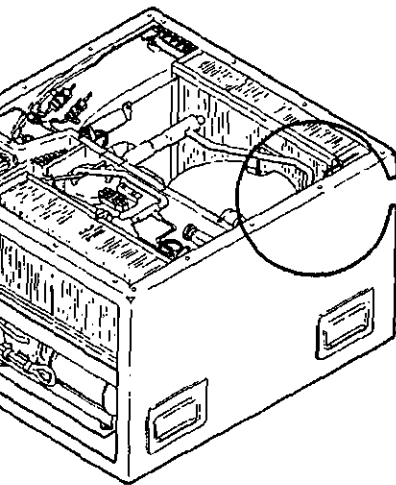
REMOVAL OF VALVE

- a. Disconnect all power to unit.
- b. Discharge refrigerant.
- c. Remove top covers.
- d. Disconnect solenoid valve electrical connector.

WARN

High voltage

Paragraph



LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

REMOVAL OF VALVE

CAUTION

- Body tube and plunger assembly must be removed before any heat is applied to valve body.
- e. Remove two socket-head cap screws.
 . . .
- f. Carefully pull tube and plunger from valve body.
 . . .
- g. Remove diaphragm.
 . . .
- h. Unsolder valve body from tubing.
 . . .

VALVE INSTALLATION

CAUTION

- Remove coil, body tube and plunger assembly, and diaphragm from new solenoid valve before soldering onto tubing.
- a. Solder body on tubing.
 . . .

CAUTION

- Allow valve body to cool before installing body tube and plunger.
- b. Install body, tube and plunger assembly, and diaphragm.
 . . .
- c. Install coil.
 See "Coil Replacement"
- d. Install electric wiring.
 . . .

ACTION/ITEM	ACTION	REMARKS
-------------	--------	---------

INSTALLATION

- e. Install new drier/filter.

Paragraph 6-14.
- f. Nitrogen Purge system.

Paragraph 6-5.
- g. Leak test and evacuate

Paragraphs 6-2 and 6-6
- h. Charge refrigerant system.

Paragraph 6-8
- i. Replace covers.

. . .

ANSION VALVE

vers:

ral

ation

UP

Configurations

Equipment Descriptions

Power OFF

Removed from shelter

ment

Special Environmental Conditions

None

ols

General Safety Instructions

See WARNING page

Parts

References

None

Flux

Alloy

g Manifold

glasses

and Soldering Set

PD680

nt Solution

g cloths

ant R22

Troubleshooting References

None

Personnel Required

Direct support

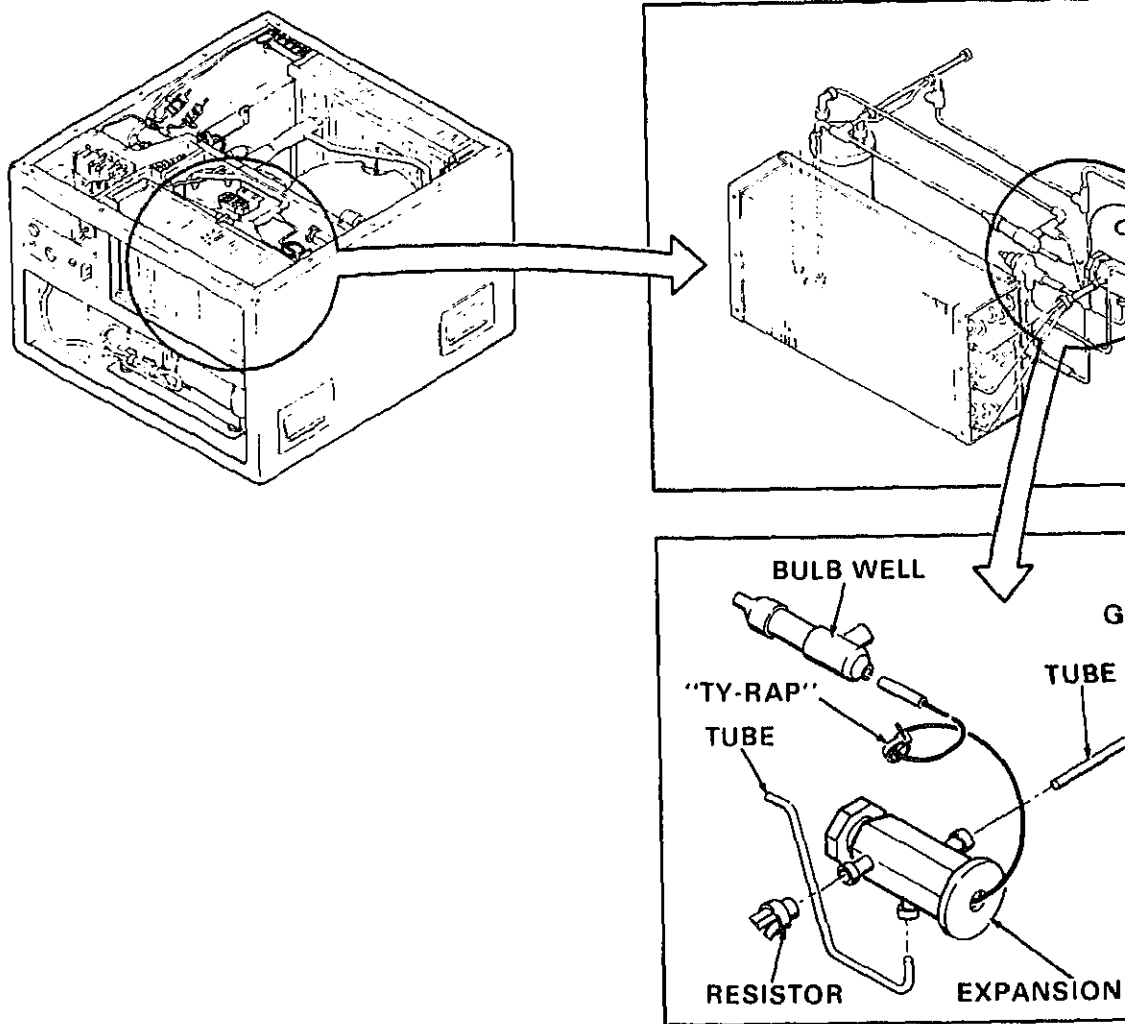


Figure 6-16. Expansion Valve

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

VAL

NOTE

The main thermal expansion valve is hermetically sealed and cannot be repaired.

- | | |
|---|---------------|
| a. Discharge the refrigerant system. | Paragraph 6-4 |
| b. Remove housing top covers. | . . . |
| c. Remove mastic from bulb well. | . . . |
| d. Remove bulb from well. | . . . |
| e. Unsolder thermal expansion valve from tubing and restrictor (distributor). | Paragraph 6-3 |

ALLATION

- | | |
|---|------------------------|
| a. Install new drier/filter. | Paragraph 6-14 |
| b. Wrap valve with wet rag to prevent overheating valve during soldering. | . . . |
| c. Solder valve to tubing and restrictor (distributor). | . . . |
| d. Insert approximately one ounce of thermal mastic in bulb well. | . . . |
| e. Insert sensing bulb of expansion valve. | . . . |
| f. Move bulb back and forth to distribute mastic. | . . . |
| g. Set bulb approximately one inch beyond open end. | . . . |
| h. Nitrogen purge system. | Paragraph 6-5 |
| i. Leak test and evacuate. | Paragraphs 6-2 and 6-6 |
| j. Charge refrigerant system. | Paragraph 6-8 |
| k. Replace covers. | . . . |

6-17. EVAPORATOR COIL.

This task covers:

- Removal
- Cleaning
- Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

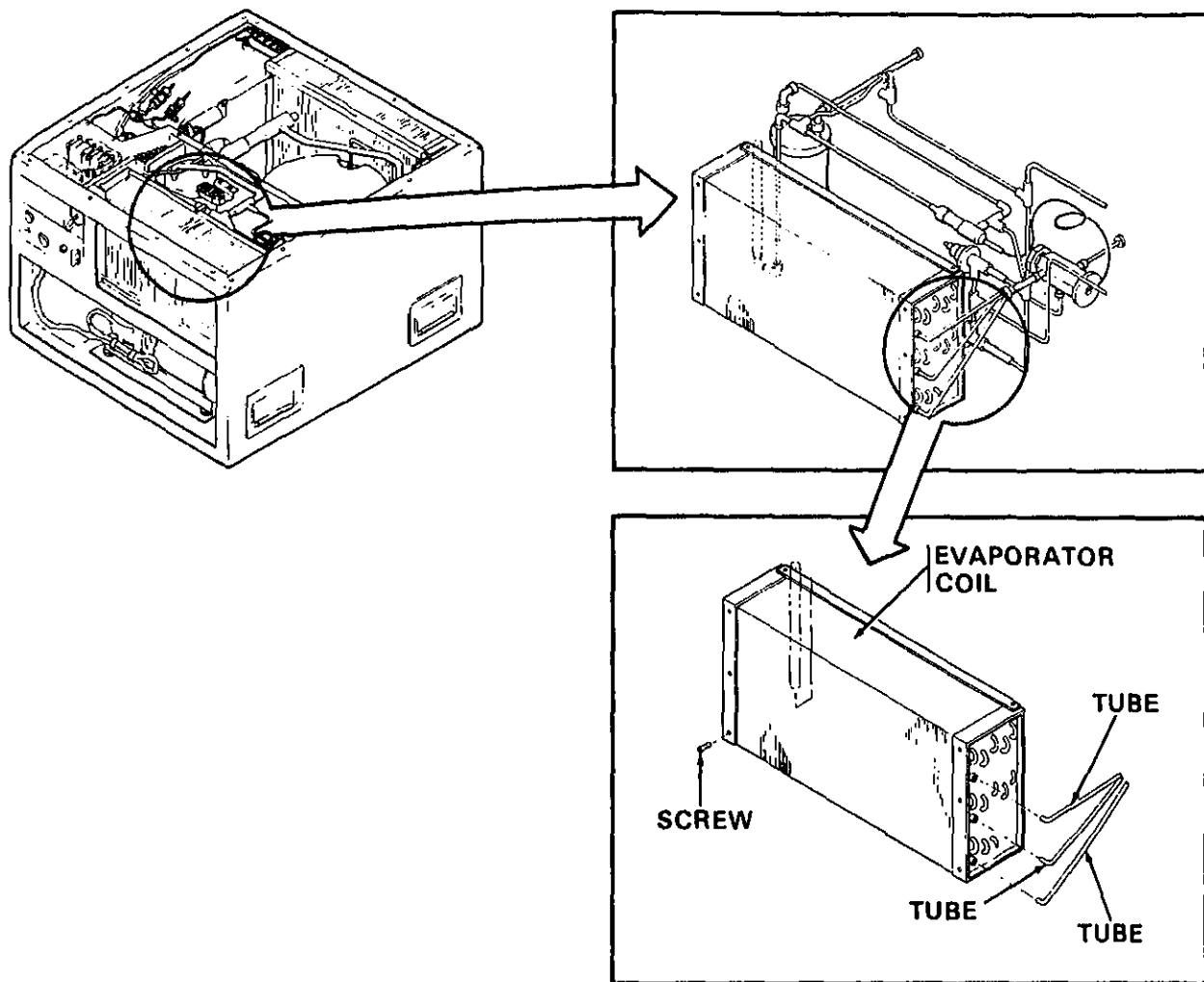
NOTE

Remove restrictor (distributor) with the evaporator coil.

REMOVAL

- Discharge refrigerant system.

Para



A01301
TM5 4120-367-14-49

Figure 6-17. Evaporator Coil

LOCATION/ITEM

ACTION

REMARKS

f. Unsolder tubing from evaporator coil.

Paragraph 6-3

g. Remove six screws and lock washers.

. . .

h. Lift evaporator from frame.

. . .

LOCATION/ITEM	ACTION	REMARKS
	e. Clamp bulb well to coil.	. . . .
	f. Install mist eliminator.	Paragraph 5-20.
	g. Install air outlet louver.	. . . .
	h. Nitrogen purge system	Paragraph 6-4
	i. Leak test and evacuate.	Paragraphs 6-2 and
	j. Charge refrigerant system.	Paragraph 6-8
	k. Replace covers.	. . . .

6-18. BULB WELL.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

- Brazing Flux
- Brazing Alloy
- Charging Manifold
- Safety glasses
- Brazing and Soldering Set

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

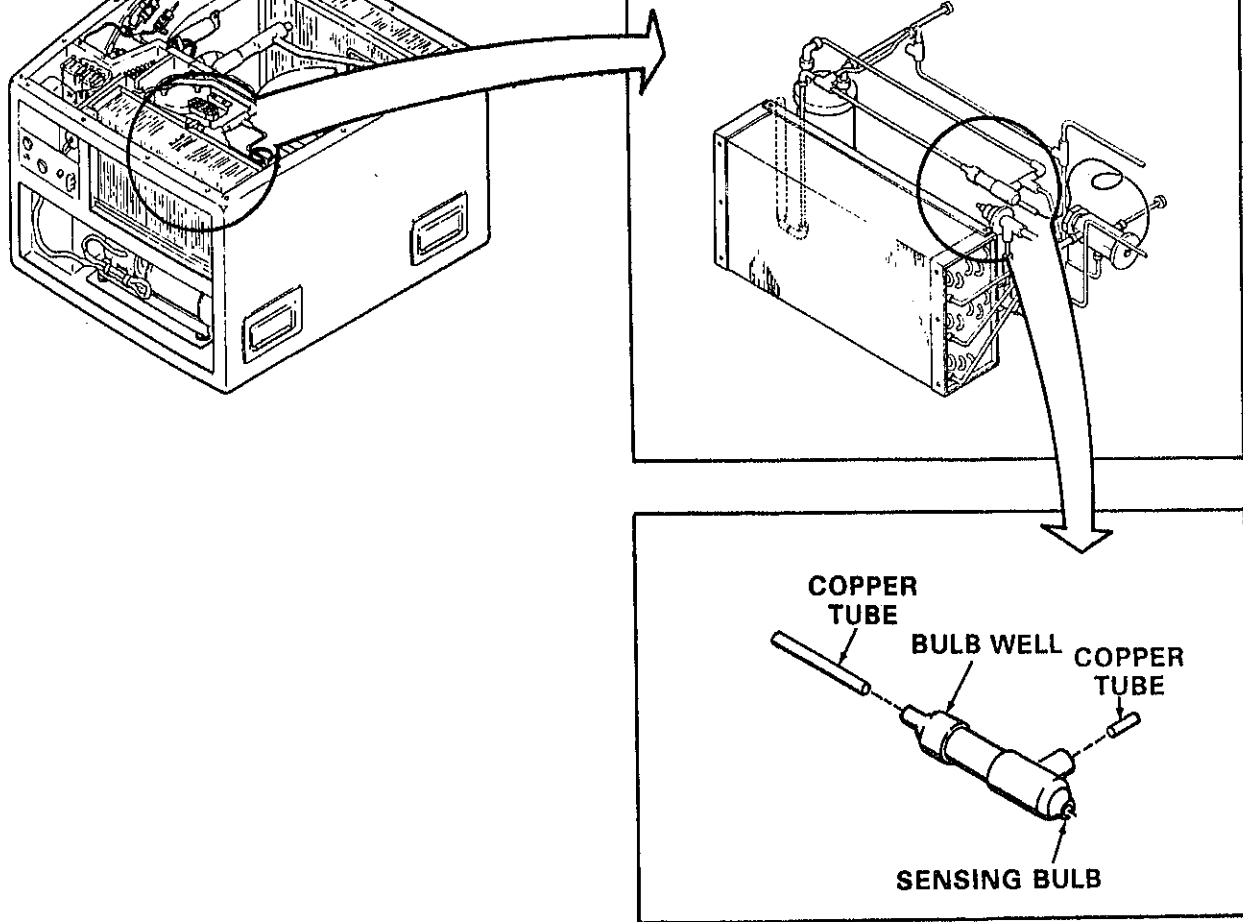
See WARNING page

References

None

Troubleshooting References

None



A01302

TM5-4120-367-14-50

Figure 6-18. Bulb Well

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Release refrigerant charge.	Paragraph 6-4
	b. Remove top covers.	. . .
	c. Remove clamps.	. . .
	d. Remove mastic.	. . .

CAUTION

Use care to avoid breaking or kinking sensing line.

INSTALLATION

- | | |
|---|---------------|
| a. Replace drier/filter. | Paragraph 6-1 |
| b. Solder bulb well to tubing. | Paragraph 6- |
| c. Insert approximately one ounce of thermal mastic in bulb well. | . . . |
| d. Insert sensing bulb of expansion valve. | . . . |
| e. Move bulb back and forth to distribute mastic. | . . . |
| f. Set bulb approximately one inch beyond open end. | . . . |
| g. Clamp bulb well to evaporator. | . . . |
| h. Nitrogen purge system. | Paragraph 6 |
| i. Leak test and evacuate. | Paragraphs |
| j. Charge system. | Paragraph 6 |
| k. Replace covers. | . . . |

9. ACCUMULATOR

task covers:

Removal

Installation

PRELIMINARY SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux

Brazing Alloy

Charging Manifold

Safety glasses

Brazing and Soldering Set

Solvent PD680

Detergent Solution

Cleaning cloths

Refrigerant R22

Nitrogen (cylinder)

Tools (Paragraph 3-1)

Abrasive cloth

Scale

Gloves

Equipment Descriptions

Power OFF

Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

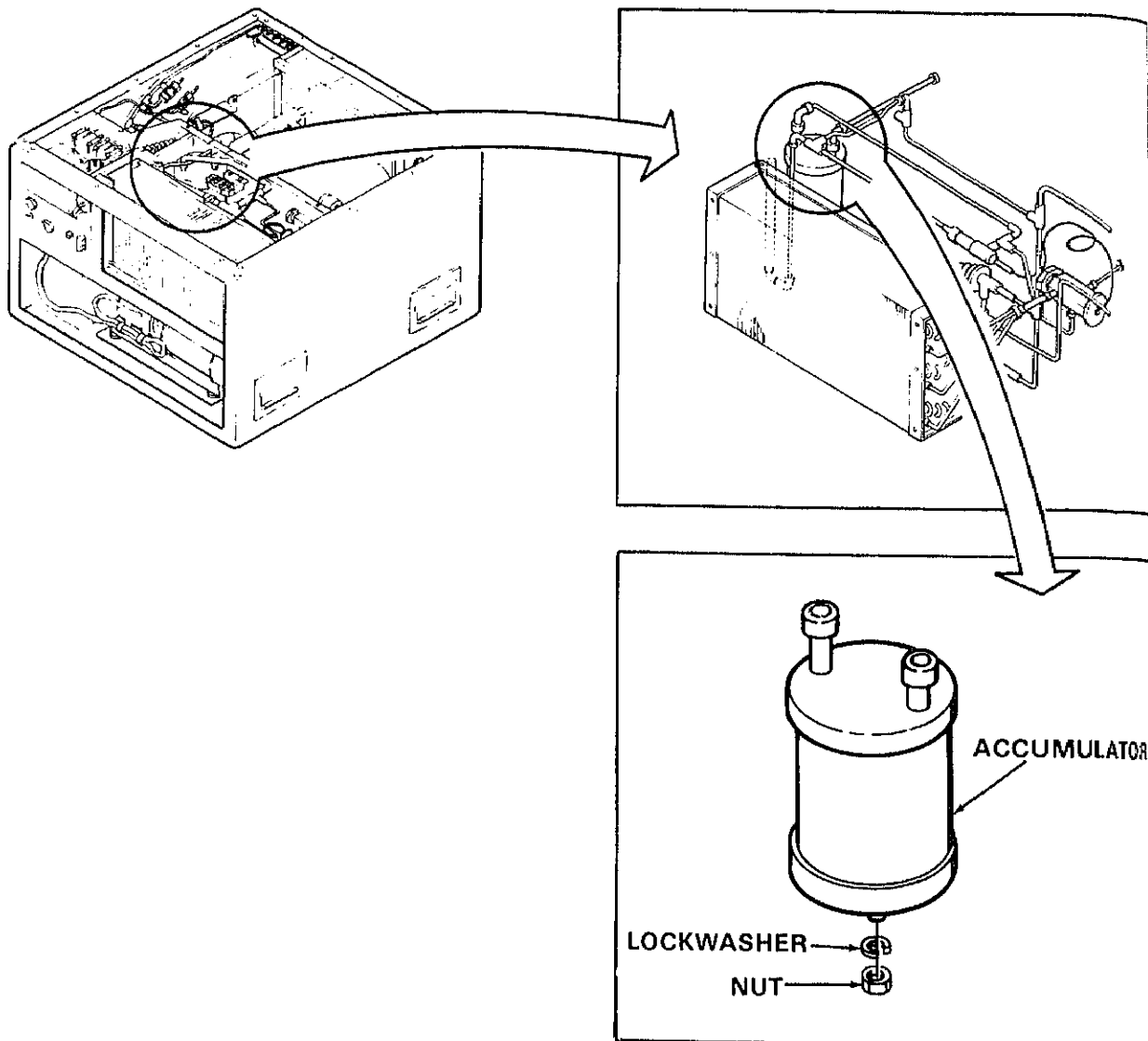


Figure 6-19. Accumulator

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

OVERHAUL

- | | |
|---|----------------|
| a. Release entire refrigerant charge. | Paragraph 6-4. |
| b. Remove top covers. | . . . |
| c. Remove air inlet louver. | . . . |
| d. Remove nut and lock washer from stud on bottom of accumulator. | . . . |
| e. Tag inlet and outlet piping. Disconnect piping. | . . . |
| f. Pull accumulator from frame. | . . . |

REINSTALLATION

- | | |
|--|-----------------|
| a. Install new drier/filter. | Paragraph 6-14. |
| b. Install accumulator with stud through hole in bottom of evaporator compartment. | . . . |
| c. Install lock washer and nut. | . . . |
| d. Connect piping. | Paragraph 6-3. |

CAUTION

Inlet and outlet are imprinted with the words "Inlet", "Outlet". Inlet and outlet must be properly connected.

- | | |
|-------------------------------|-------------------------|
| e. Install air inlet louver. | . . . |
| f. Nitrogen purge system. | Paragraph 6-5. |
| g. Leak test and evacuate. | Paragraphs 6-2 and 6-6. |
| h. Charge refrigerant system. | Paragraph 6-8. |
| i. Replace covers. | . . . |

6-20. CHARGING VALVES

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

REMOVAL

- a. Release refrigerant charge.
- b. Remove top covers.
- c. Remove loop clamps.
- d. Remove valve from system.

Paragraph 6-4.

. . .

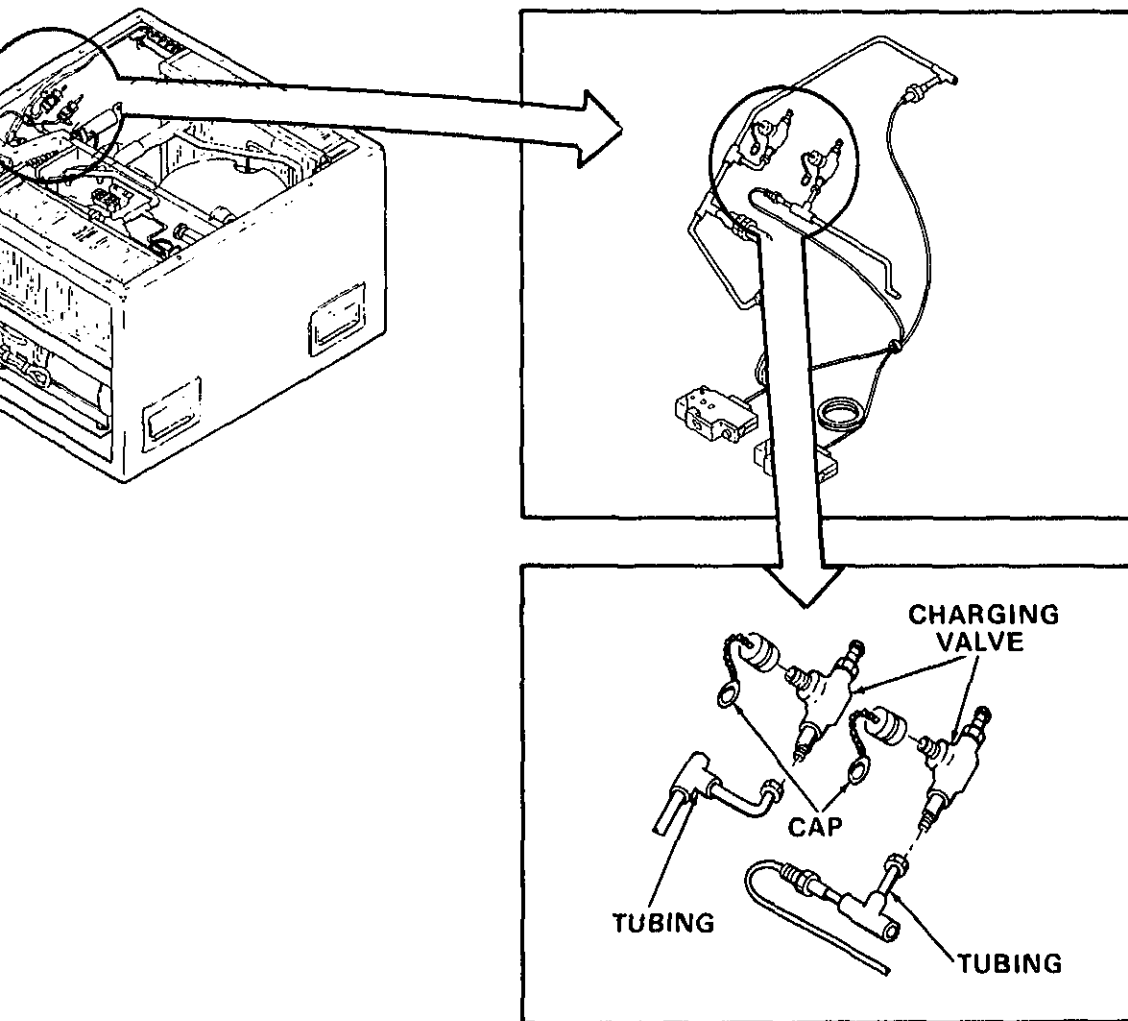
. . .

. . .

INSTALLATION

- a. Install new valve.

. . .



A01304
TM6-4120-387-14-52

Figure 6-20. Charging Valve

6-21. PRESSURE RELIEF VALVE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUPApplicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
 Brazing Alloy
 Charging Manifold
 Safety glasses
 Brazing and Soldering Set
 Solvent PD680
 Detergent Solution
 Cleaning cloths
 Refrigerant R22
 Nitrogen (cylinder)
 Tools (Paragraph 3-1)
 Abrasive cloth
 Scale
 Gloves

Equipment Descriptions

Power OFF
 Removed from shelter

Special Environmental Con

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

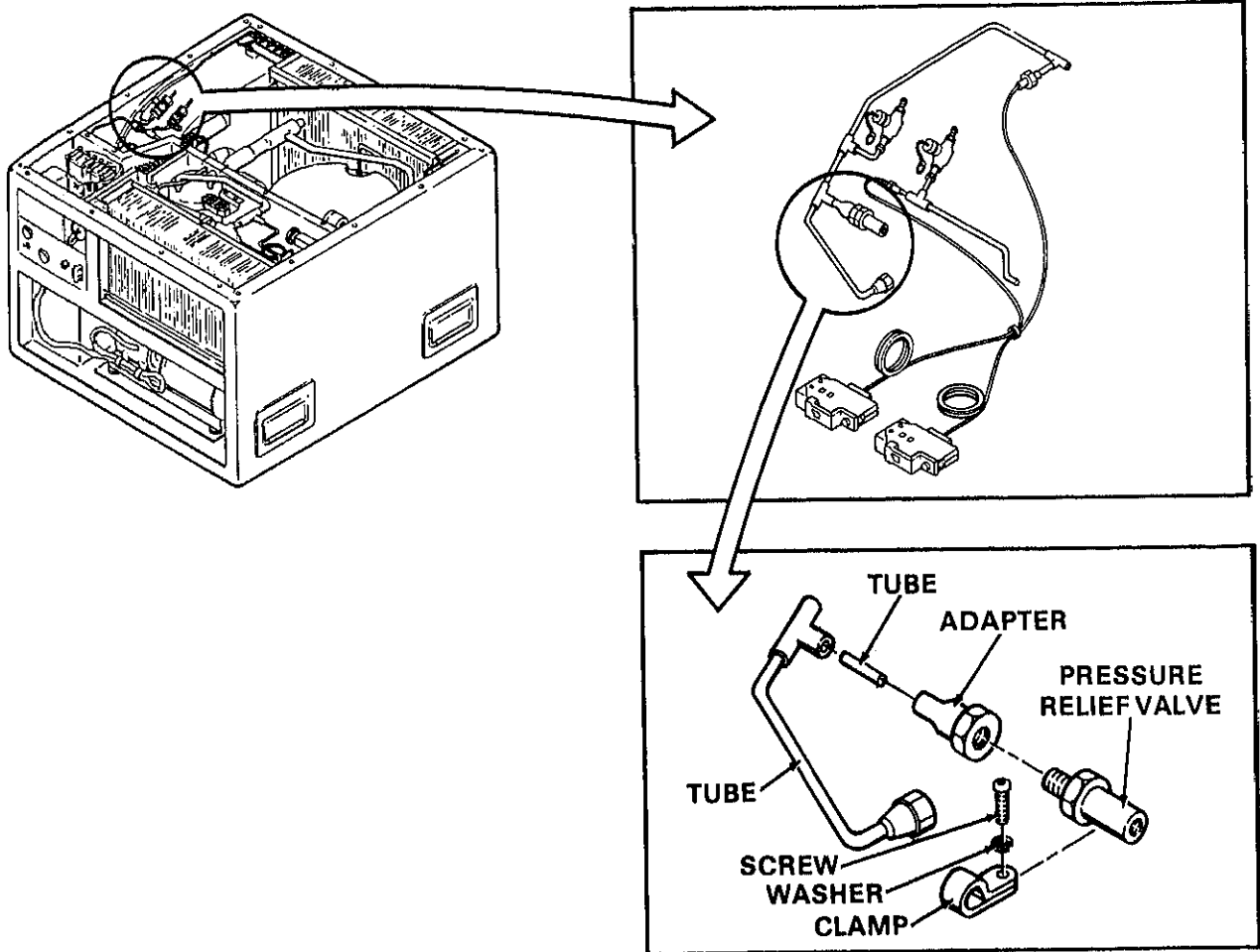
LOCATION/ITEM**ACTION****REMARKS****REMOVAL**

a. Release refrigerant charge.

Paragraph

b. Remove top covers.

. . .



A01306
TM5-4120-367-14-B3

Figure 6-21. Pressure Valve

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION	a. Install new drier/filter.	Paragraph 6-14.
	b. Thread valve into system.	Paragraph 6-3.
	c. Install loop clamps.	
	d. Nitrogen purge system.	Paragraph 6-5.
	e. Leak test and evacuate	Paragraphs 6-2 and 6-6.

6-22. ACTUATING CYLINDER

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Charging Manifold
Safety glasses
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

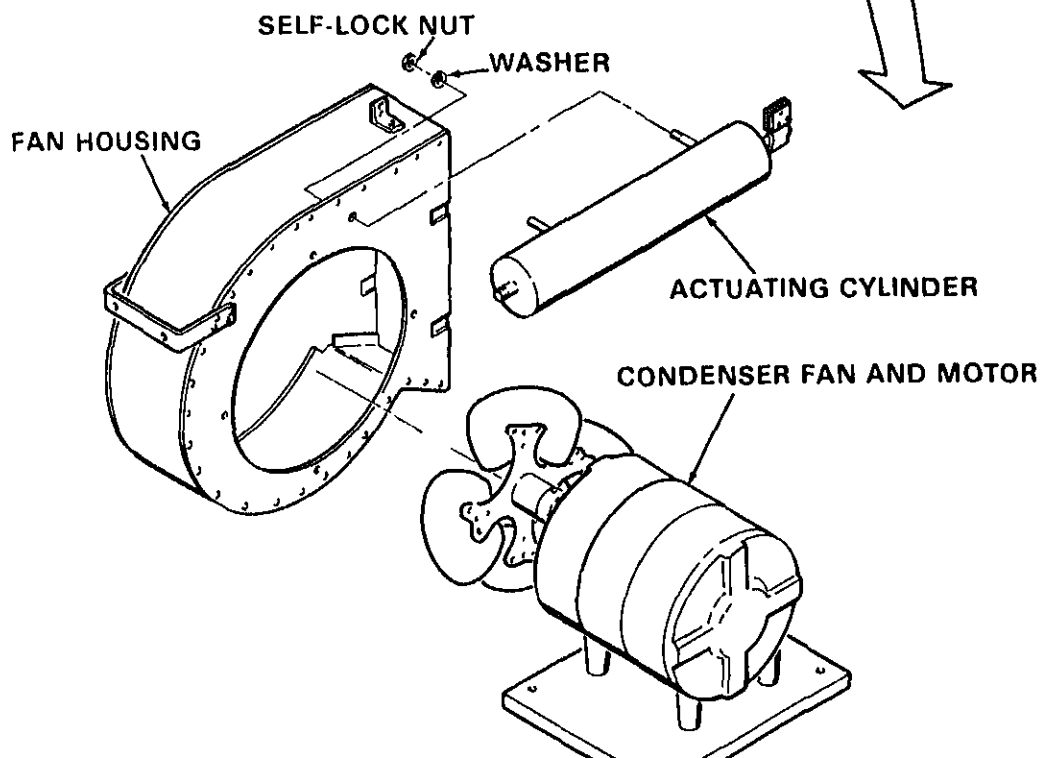
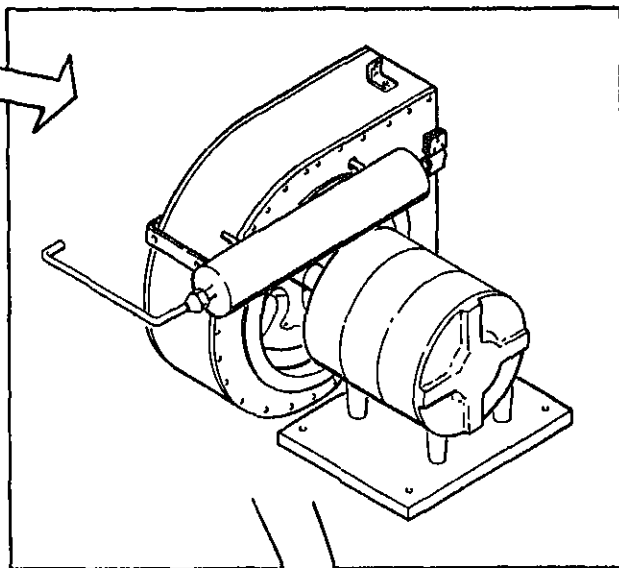
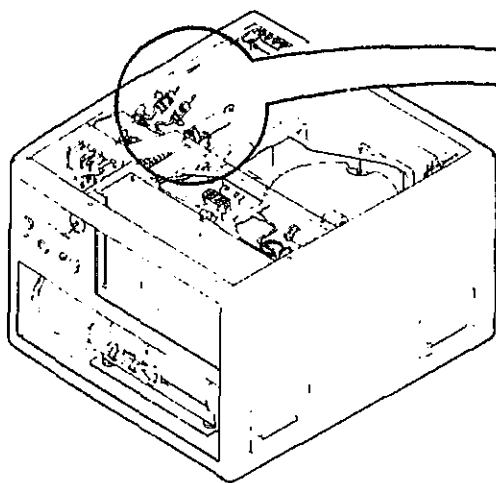
None

Troubleshooting References

None

Personnel Required

Direct support



REMOVAL

- a. Release entire refrigerant charge.
- b. Remove top cover.
- c. Loosen post screw.
- d. Loosen control wire.
- e. Remove casing nuts at each end.
- f. Remove push-pull control.
- g. Disconnect elbow swivel nut from end of actuator cylinder.
- h. Remove condenser guard.
- i. Remove five screws and lock washers.
- j. Remove louver assembly.
- k. Remove two nuts and lock washers.

INSTALLATION

- a. Install actuating cylinder with studs through openings in fan housing.
- b. Install lock washers and nuts on studs.
- c. Connect elbow swivel nut.
- d. Install condenser air discharge louver assembly.
- e. Install five screws and lock washers and two screw base studs.
- f. Install condenser guard.
- g. Install push-pull control.
- h. Place outer control casing nuts over wire.
- i. Insert wire ends into openings in mechanical posts on louver lever and actuator cylinder.

CONDENSER LOUVER ADJUSTMENT

mask covers:

- Replacement
- Cleaning
- Adjustment

L SETUP

able Configurations

quipment

ne

al Tools

ne

rials/Parts

- ergent Solution
- aning cloths
- ts (Paragraph 3-1)
- ves

ment Descriptions

- ver OFF
- moved from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

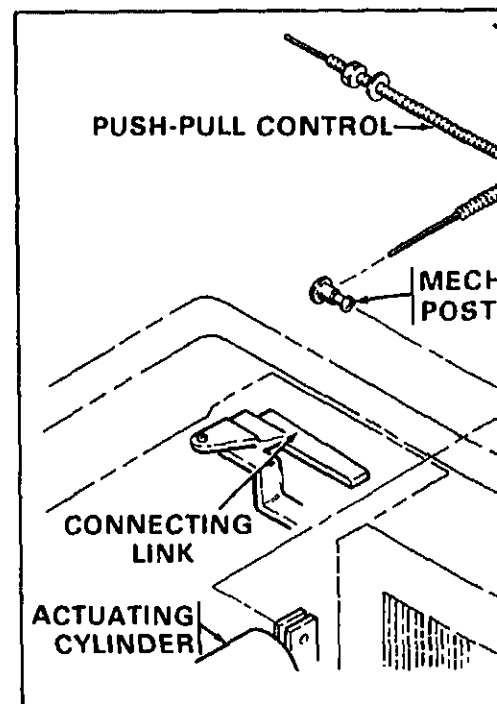
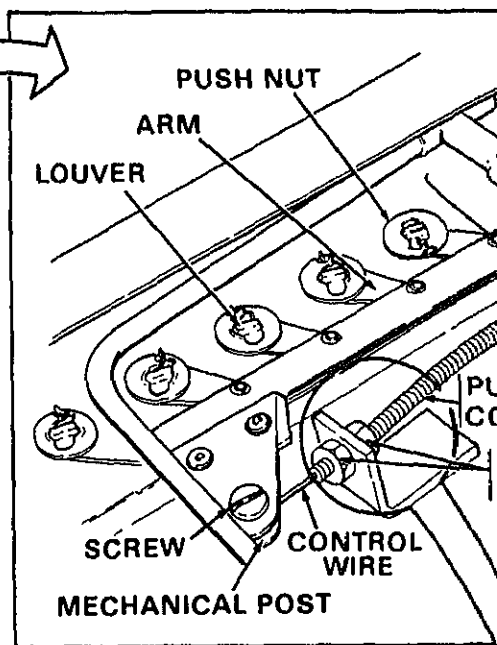
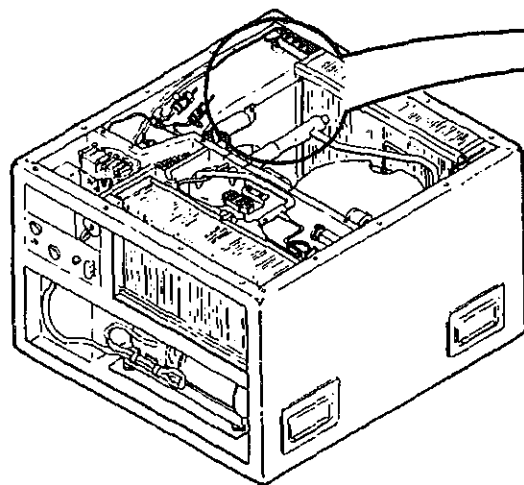
None

Troubleshooting References

None

Personnel Required

Direct support



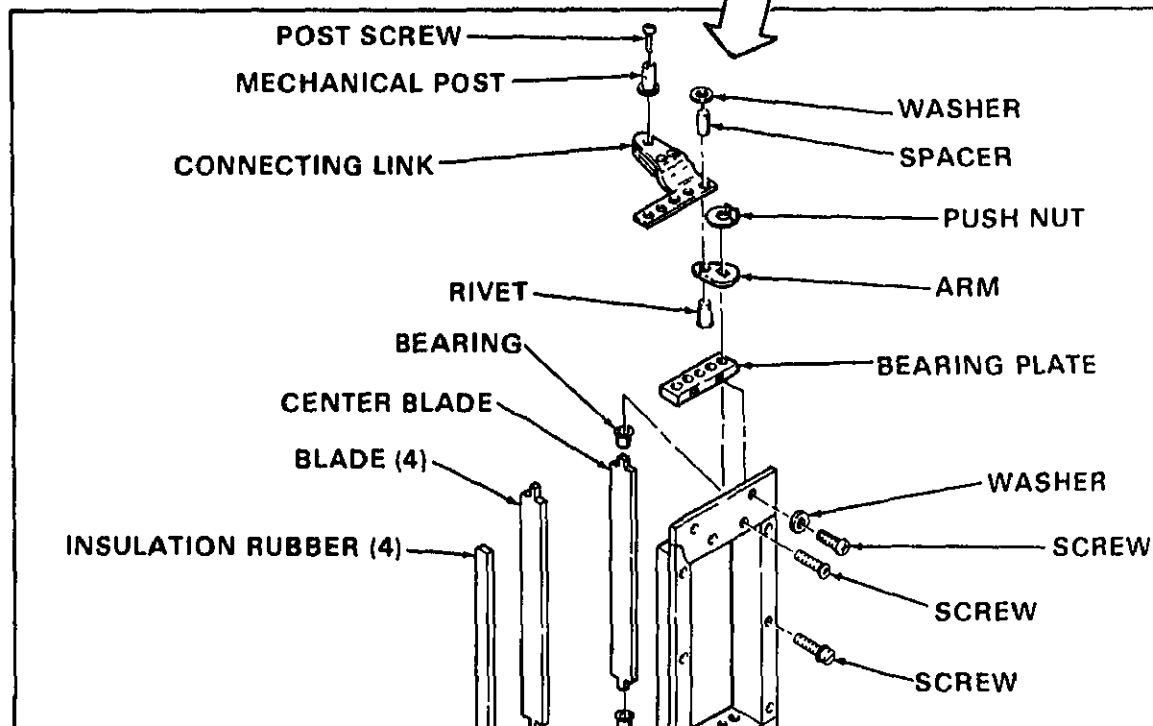
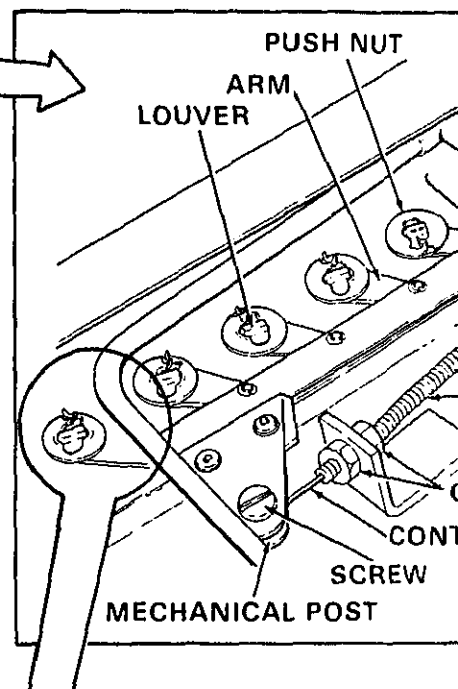
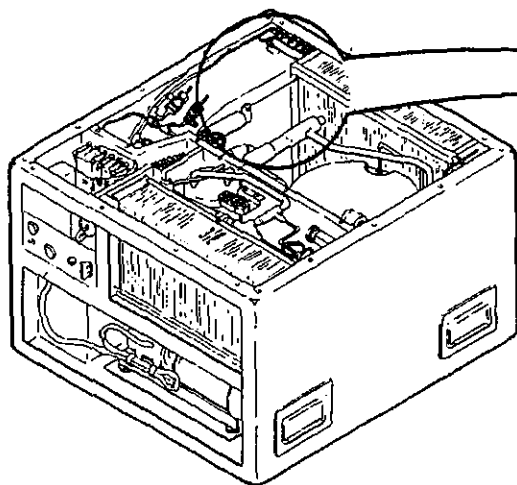
ACTION/ITEM	ACTION	REMARKS
MENT	<ul style="list-style-type: none"> a. Before system is charged, adjust louver push-pull control. b. Close louver blades and tighten screw in mechanical post to lock wire on that end. c. Extend actuator rod until there is a ¼ inch space between inner edge of mechanical post bracket and the face of the cylinder. d. Tighten the mechanical post screw. e. Nitrogen purge system. f. Leak test and evacuate. g. Charge refrigerant system. h. Replace covers. 	<ul style="list-style-type: none"> Paragraphs 6-2 and 6-6.

**R
CEMENT**

NOTE

Individual Louver Blades are flexible enough for removal.

- a. Remove rear top cover. . . .
- b. Remove "push-on" type nut from louver blade to be removed. . . .
- c. Bend blade to remove ends from bearings. . . .
- d. Remove Blade



LOCATION/ITEM	ACTION	REMARKS
REFILLING	e. Bend new blade in same manner as removal.	. . .
	f. Install end bearings.	. . .
	g. Install "push-on" nut.	. . .
CLEANING	a. Use a clean dry cloth.	. . .
	b. Use detergent solution.	. . .
TESTING	a. Turn off air conditioner and wait four hours or until air conditioner is uniformly at ambient temperature or head pressure is below 150 psig (10.516 kg/cm ²)	. . .
	b. Remove rear top cover.	. . .
	c. Loosen mechanical post screw.	. . .
	d. Close condenser louvers.	. . .
	e. Pull wire tight and tighten mechanical post screw.	. . .
	f. Louvers must be tightly closed when air conditioner is off and head pressure is below 150 psig (10.516 kg/cm ²).	. . .

6-24. CONDENSER FAN AND MOTOR

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Solvent PD680
Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

REMOVAL

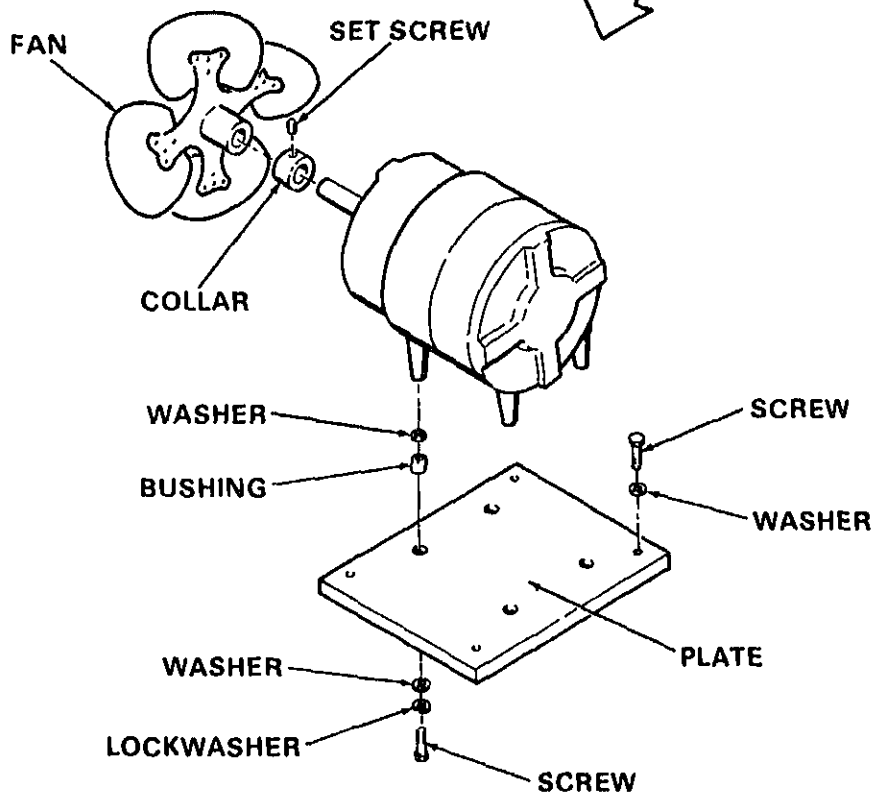
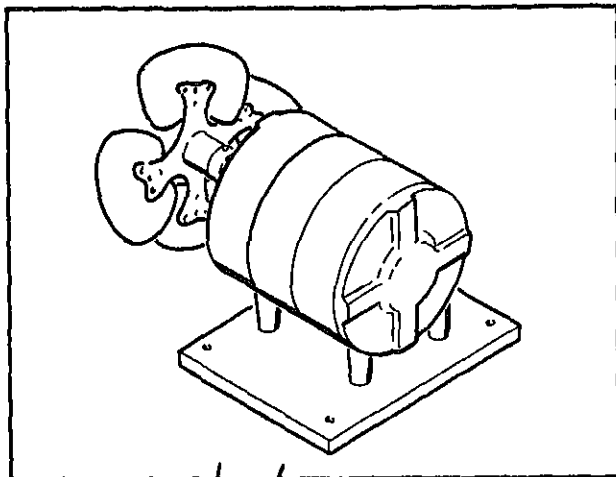
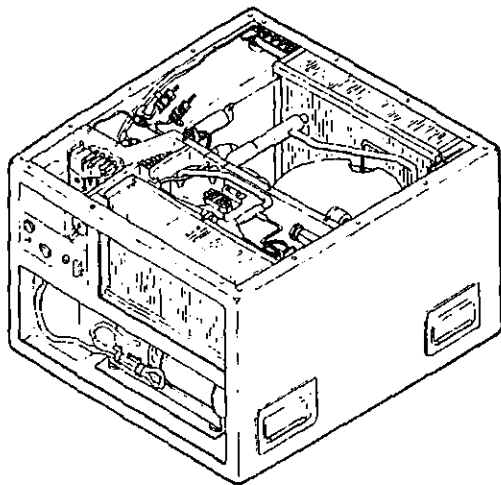
WARNING

a. Remove power from air conditioner.

High voltage can kill.

b. Disconnect motor electrical connector.

. . .



CAUTION

Do not hammer fan on or off motor shaft; motor bearings would be damaged. Dress out roughness with a fine file, stone or abrasive cloth. Apply a coating of light machine oil to ease assembly.

NOTE

If fan only is to be replaced it is not necessary to remove motor.

- c. Loosen setscrew in fan hub. . . .
- d. Pull fan from motor shaft. . . .
- e. Loosen setscrew. . . .
- f. Pull bushing from motor shaft. . . .
- g. Remove four screws and washers which secure motor and fan assembly to the frame. . . .
- h. Remove four screws, lock washers, flat washers and bushings. . . .
- i. Lift motor from plate. . . .
- j. See paragraph 6-29 for motor repair. . . .

CAUTION

Do not hammer fan on or off motor shaft; motor bearings would be damaged. Dress out roughness with a fine file, stone, or abrasive cloth. Apply a coating of light machine oil to ease assembly.

INSTALLATION

- a. Slide bushing onto motor shaft. . . .
- b. Tighten setscrew in bushing. . . .

NOTE

It may be necessary to trial fit motor

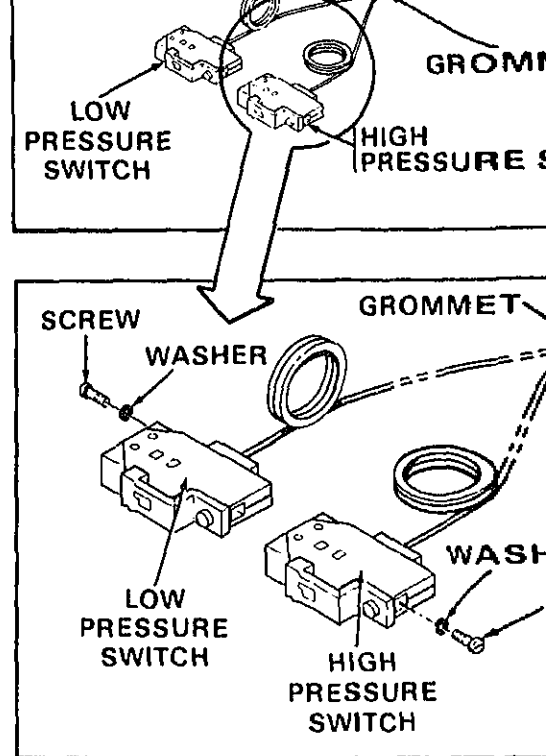
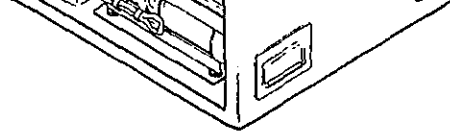
LOCATION/ITEM	ACTION	REMARKS
<div>LOCATION</div>	<div>e. Aline keyway in motor shaft with fan key shaft.</div> <div>f. Install key.</div> <div>g. Press fan onto motor shaft.</div> <div>h. Check that fan will be centered in fan inlet.</div> <div>i. If necessary lift fan and motor out and change size of motor mount bushings.</div> <div>j. Secure motor and plate to frame using four screws and washers.</div> <div>k. Connect motor electrical connector.</div> <div>l. Replace top cover.</div>	<div>. . .</div> <div>. . .</div> <div>. . .</div> <div>. . .</div> <div>. . .</div> <div>. . .</div> <div>. . .</div>

HIGH AND LOW PRESSURE SWITCHES

covers:

oval
illation

<div>SETUP</div> <div> e Configurations </div> <div> oment </div> <div> ools </div> <div> Parts </div>	<div>Equipment Descriptions</div> <div> Power OFF Removed from shelter </div> <div>Special Environmental Conditions</div> <div> None </div> <div>General Safety Instructions</div> <div> See WARNING page </div> <div>References</div>
--	---



TM6-41

Figure 6-26. High and Low Pressure Switch

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	a. Disconnect electrical power to air conditioner.	High voltage can
	b. Discharge refrigerant.	Paragraph 6
	c. Pull junction box out of frame.	. . .
	d. Remove two mounting screws and lock washers	. . .

WARNING

ACTION/ITEM

ACTION

REMARKS

L

c. Disconnect capillary tube connection.

. . .

f. Tag and disconnect electric wires from switch.

. . .

g. Pull capillary tube thru grommet.

. . .

h. Pull switch from air conditioner.

. . .

ACTION

a. Insert capillary tube thru grommet.

. . .

b. Connect capillary tube to fitting.

. . .

c. Install switches.

. . .

d. Secure with two screws and washers.

. . .

e. Connect electric wires.

. . .

f. Replace drier/filter.

Paragraph 6-15

g. Nitrogen purge system.

Paragraph 6-5

h. Leak test and evacuate.

Paragraphs 6-2 and 6-6.

i. Charge system with liquid refrigerant.

Paragraph 6-8

j. Replace control panel.

. . .

k. Replace covers.

. . .

l. Connect electric power.

. . .

m. Test air conditioner.

. . .

INITIAL SETUPApplicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Brazing Flux
Brazing Alloy
Charging Manifold
Safety glasses
Brazing and Soldering Set
Solvent PD680
Detergent Solution
Cleaning cloths
Refrigerant R22
Nitrogen (cylinder)
Tools (Paragraph 3-1)
Abrasive cloth
Scale
Gloves
Thermal mastic (97403) 13216E6210

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEMACTIONREMARKS**NOTE****REMOVAL**

The quench thermal expansion valve is hermetically sealed and cannot be repaired.

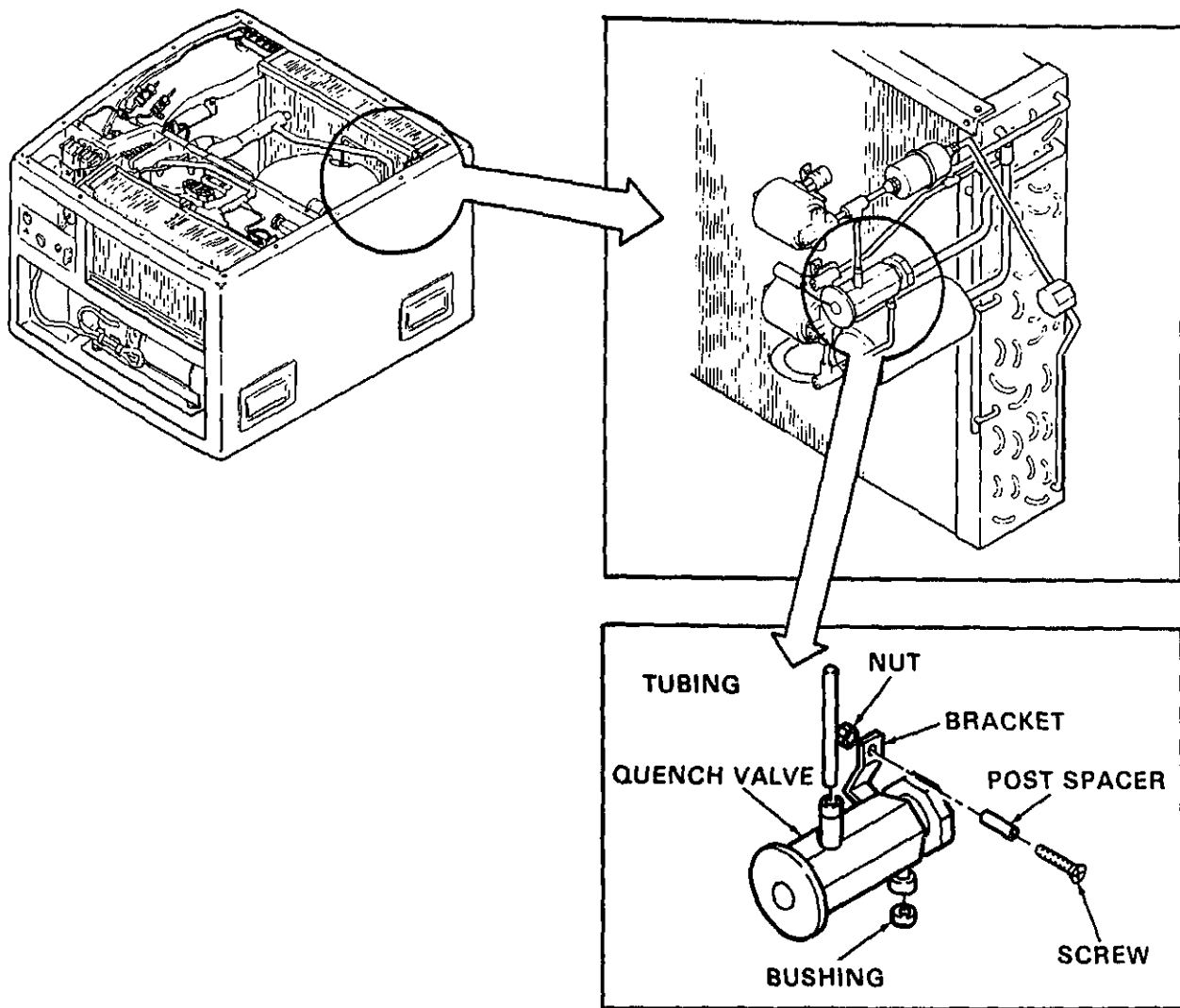
- a. Discharge the refrigerant system.
- b. Remove housing rear top cover.
- c. Remove mastic in bulb well, remove bulb from well.
- d. Remove two screws, spacers, self-locking nuts, and valve mounting brackets.

Paragraph 6-4

. . .

. . .

. . .



A01311

TM5-4120-367-14-59

Figure 6-27. Quench Valve

LOCATION/ITEM

ACTION

REMARKS

NOTE

Wrap valve with wet cloth to prevent overheating valve during soldering.

c. Unsolder tube at tee connection to

- f. Set bulb approximately one inch beyond open end. . . .
- g. Install new drier/filter. Paragraph 6-15
- h. Nitrogen purge system. Paragraph 6-5
- i. Leak test and evacuate. Paragraphs 6-2
- j. Charge system with liquid refrigerant. Paragraph 6-3
- k. Replace covers. . . .

PRESSURE REGULATORS

vers:

al
ation

JP
Configurations

ment

ols

Parts

Flux
Alloy
g Manifold
lasses
and Soldering Set
PD680
nt Solution
g cloths
ant R22
n (cylinder)
aragraph 3-1)
e cloth

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

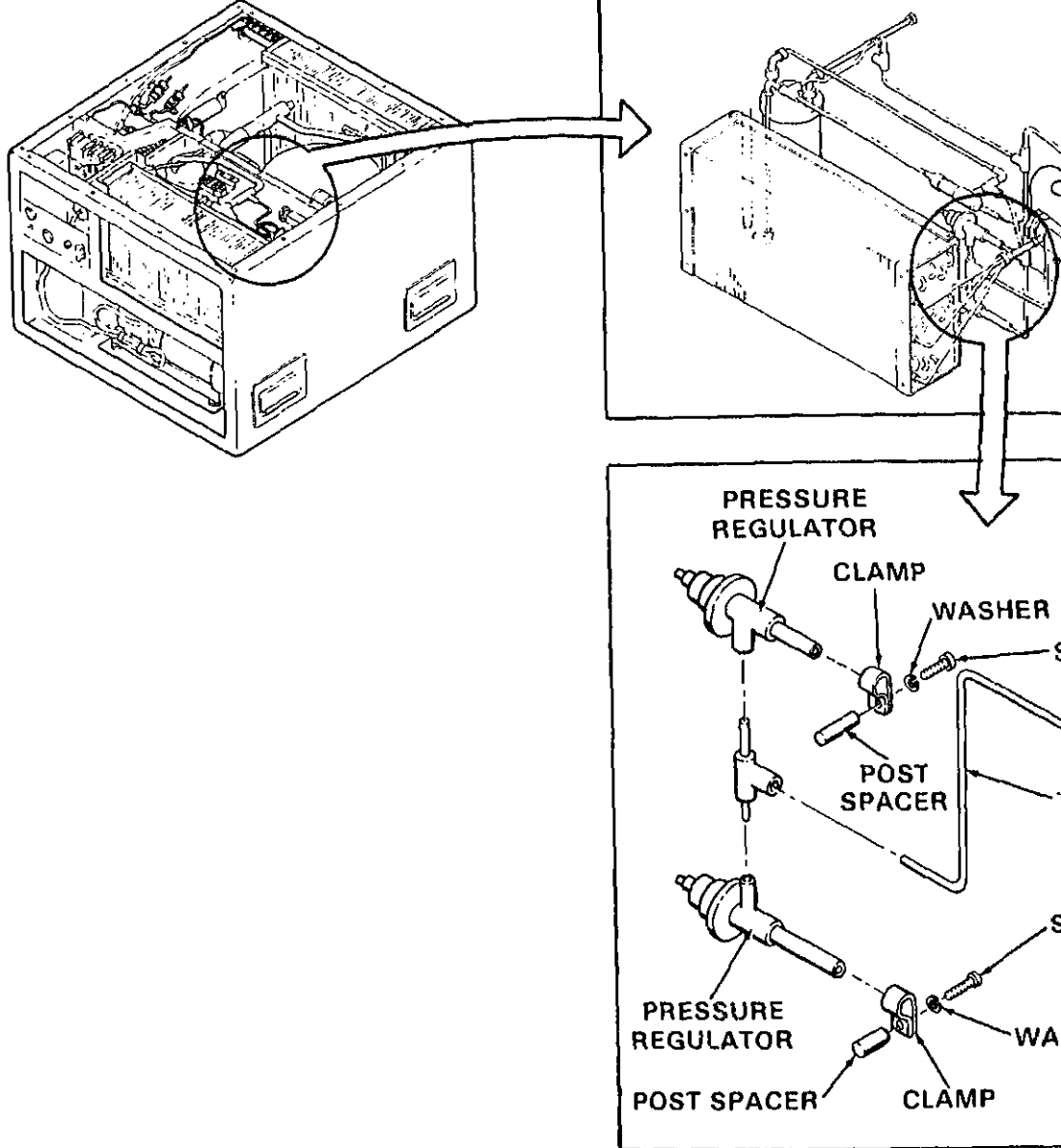


Figure 6-28. Pressure Regulator

TION/ITEM	ACTION	REMARKS
	a. Release refrigerant charge.	Paragraph 6-4
	b. Remove top covers.	. . .
	c. Remove screws, lock washers, loop clamps, and spacers.	. . .
	d. Unsolder pressure regulator from tubing.	Paragraph 6-3
TION	a. Install new drier/filter	Paragraph 6-15

NOTE

Pressure regulator is factory set and is not field adjustable.

- | | |
|--|-------------------------|
| b. Wrap pressure regulator with wet cloth to prevent overheating regulator during soldering. | . . . |
| c. Solder pressure regulator to tubing. | . . . |
| d. Install spacer, loop clamp, screw, and lock washer. | . . . |
| e. Nitrogen purge system. | Paragraph 6-5 |
| f. Leak test and evacuate. | Paragraphs 6-2 and 6-6. |
| g. Charge system with liquid refrigerant. | . . . |
| h. Replace covers. | . . . |

6-28. EVAPORATOR BLOWER AND MOTOR

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Detergent Solution
Cleaning cloths
Tools (Paragraph 3-1)
Gloves

Equipment Descriptions

Power OFF

Installed or Removed from Shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

REMOVAL OF ASSEMBLY

- a. Disconnect electric power to air conditioner.

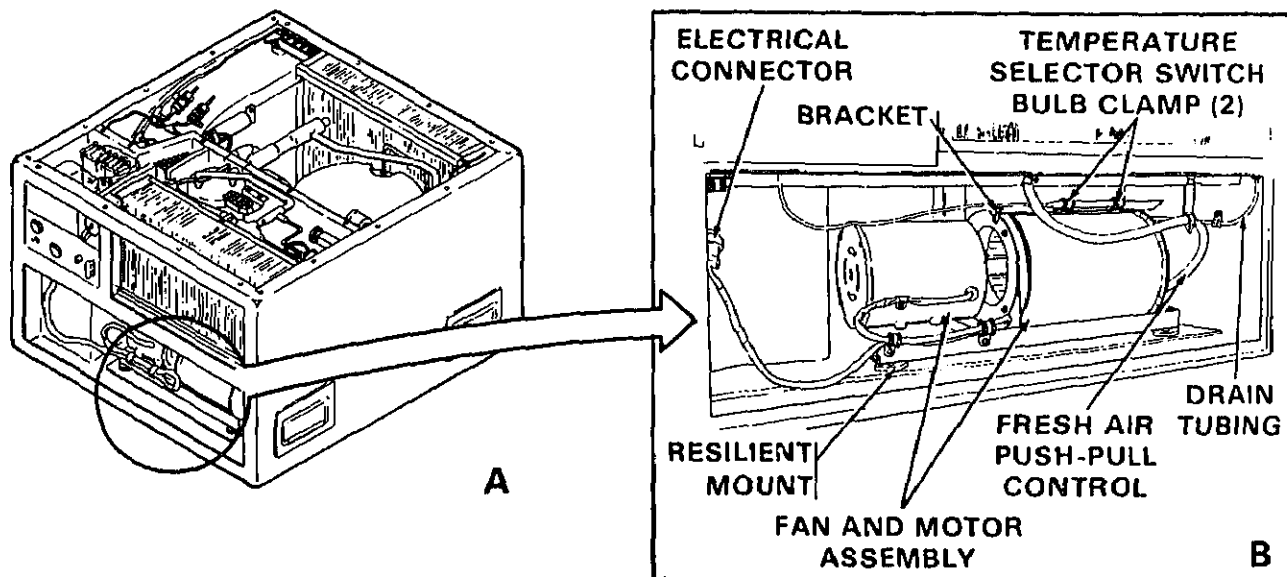
WARNING
High voltage can kill

- b. Remove air inlet louver and air filter.

Paragraph 5-19

- c. Disconnect condensate drain tubing.

Paragraph 5-23



A01313
TMB-4120-367-14-61

Figure 6-29. Evaporator Blower and Motor (Sheet 1 of 2)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF ASSEMBLY	f. Remove temperature sensing bulb.	Paragraph 5-11
	g. Remove four screws, and lockwashers which secure fan and motor base to mounts.	. . .
REMOVAL OF FAN	a. Remove fan strap.	. . .
	b. Remove motor and fan from base.	. . .
	c. Remove flange from housing.	. . .
	d. Remove the two fan inlets.	. . .
	e. Separate the motor and fan impeller from the housing.	. . .
	f. Loosen setscrew that holds shaft extension	

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OF MOTOR	a. Removal of motor is same as removal of fan.	. . .
REPAIR	a. See paragraph 6-29.	. . .
INSTALLATION	a. Place impeller on shaft extension.	. . .
	b. Tighten setscrew to secure.	. . .
	c. Place fan inlet onto face of motor.	. . .
	d. With arrow on impeller in same direction as motor rotation arrow, place shaft extension on motor shaft.	. . .
	e. Place fan inlet and flange in position against blower housing.	. . .
	f. Secure inlet and flange to housing.	. . .
	g. Slide housing over impeller.	. . .
	h. Secure fan inlet to housing.	. . .
	i. Secure fan strap to two fan inlets.	. . .
	j. Secure four mounts to base.	. . .
	k. Secure motor and housing to base.	. . .
	l. Secure assembly into air conditioner.	. . .
	m. Install three brackets.	. . .
	n. Install condensate drain.	Paragraph 5-23.
	o. <i>Connect motor power connector.</i>	. . .
	p. Install temperature sensing bulb.	Paragraph 5-11
	q. Clean air filter.	Paragraph 5-19.
	r. Install air filter and louver.	Paragraph 5-19.
	s. Connect power supply.	. . .

6-29. MOTOR.

This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Assembly

INITIAL SETUP

Applicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Safety glasses
Solvent PD680
Detergent solution
Cleaning cloths
Tools (Paragraph 3-1)
Abrasive cloth
Gloves

Equipment Descriptions

Power OFF
Removed from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

ACTION/ITEM	ACTION	REMARKS
-------------	--------	---------

EMBL Y

NOTE

Motors manufactured by IM Magnetics Corp. do not come apart the same way as those manufactured by Welco Industri als, Inc. See motor name plate to determine who made the motor.

IMC MOTOR

- Remove four hex nuts, four through bolts, and eight flat washers.
- Remove rear end bell.
- Pull out rotor.
- Remove shims, bearing spacers and bearings.
- Remove screw, washer, and loop clamp.
- Remove screw, washer, and ground terminal.
- Tag and disconnect leads and remove cable and strain relief bushing.
- For single phase motors, remove front end bell from stator.
- For three phase motors, remove thermal protector housings, thermal protectors and attaching hardware.
- Remove front end bell from stator.

WELCO MOTOR

- Remove four screws from both end brackets (covers).
- Remove both end brackets (covers).
- Remove load spring, washers, and bearings.
- Remove rotor with shaft.
- Remove eight screws and pull protector covers from motor frame to gain access to high and low speed overload protectors.

. . .

. . .

. . .

. . .

NG

- Clean metal parts with cleaning solvent (Fed Spec. P-D-680).

. . .

- Wipe off electrical parts with a clean cloth.

. . .

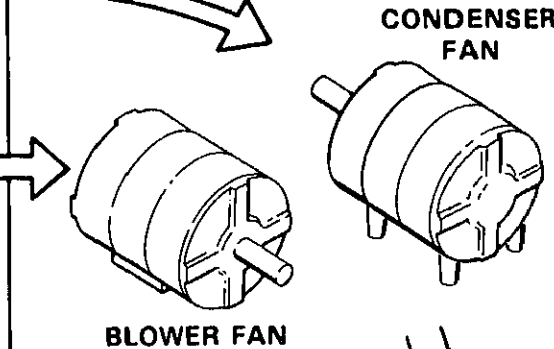
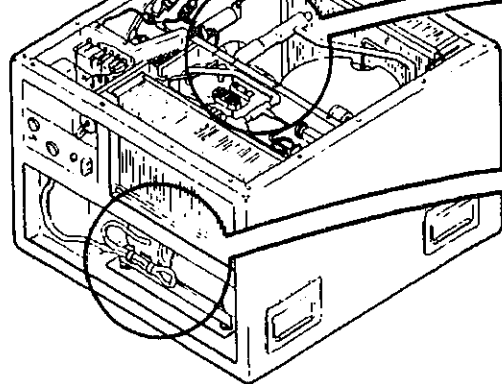
TION

- Inspect wiring for damaged insulation and broken wiring.

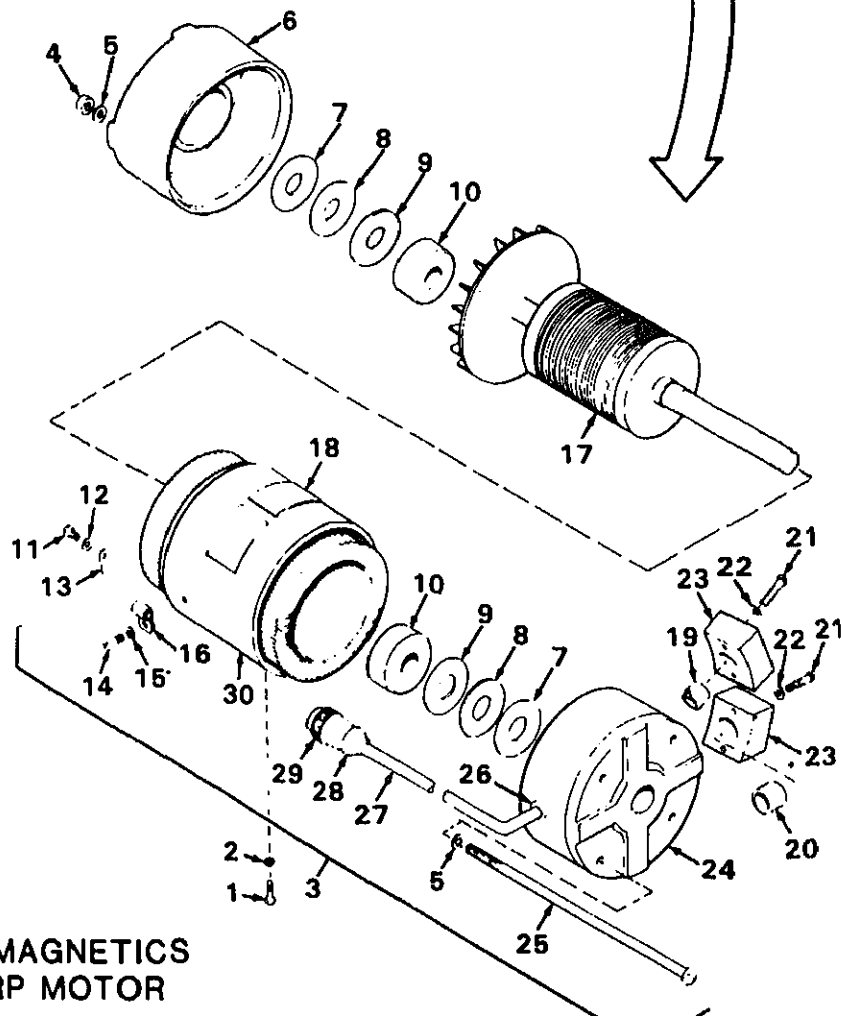
. . .

- Repair damaged insulation or replace defective wiring.

. . .



1. SCREW
2. LOCKWASHER
3. MOTOR
4. NUT
5. WASHER
6. REAR END BELL
7. SHIM
8. SHIM
9. THRUST WASHER
10. BEARING
11. SCREW
12. WASHER
13. TERMINAL
14. SCREW
15. WASHER
16. CLAMP
17. ROTOR
18. DECAL
19. PROTECTOR
20. PROTECTOR
21. SCREW
22. WASHER
23. HOUSING
24. FRONT ENDBELL
25. THRU-BOLT
26. BUSHING
27. CABLE
28. CLAMP
29. CONNECTOR
30. STATOR



IMC MAGNETICS
CORP MOTOR

surface.

- h. If defective replace motor.
- i. Inspect stator for damaged, broken or shorted wiring.

ASSEMBLY

IMC MOTOR

- a. For three phase motors, install thermal protectors and housings in front end bell.
- b. Install connector and cable.
- c. Install cable and strain relief bushing in endbell.
- d. Partially install end bell on stator.
- e. Connect terminal with screw and washer.
- f. Make electrical connections.
- g. Install shims, bearing spacers, bearings and rotor.
- h. Install rear end bell.
- i. Place a flat washer on each through bolt.
- j. Install through bolts in motor.
- k. Secure each with a nut and washer.
- l. Install loop clamp on cable.
- m. Secure clamp to stator frame with screw and washer.

WELCO MOTOR

- a. Secure the high and low speed overload protectors with protector covers and eight screws.
- b. Coat the shaft surfaces of the rotor and load springs with oil (MIL-L-2104, Grade 20).
- c. Slide both bearings on shaft ends.
- d. Slide load springs and washers on the long shaft end.
- e. Slip rotor with shaft into frame with stator.
- f. Place end brackets on shafts and align mounting holes.
- g. Tighten screws in end brackets evenly while checking rotor for freedom of rotation. There should be no drag.

. . .

. . .

. . .

For further information on electric motor repair, refer to FM 20-31 (Electric Motor and Generator Repair).

CHAPTER 7

PREPARATION FOR STORAGE OR SHIPMENT

STORAGE.

k covers:

Storage

SETUP

able Configurations

Equipment

Tools

als/Parts

ty glasses

es

vy duty cover material

ment Descriptions

er OFF

oved from shelter

Special Environmental Conditions

None

General Safety Instructions

See WARNING page

References

None

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM

ACTION

REMARKS

CONDITIONER

TERM

a. Unroll the fabric cover.

. . .

LOCATION/ITEM

ACTION

REMARKS

LONG TERM

- | | |
|---|-------|
| a. Unroll the fabric cover. | . . . |
| b. Snap cover in place. | . . . |
| c. Place air conditioner in a dry, covered, area. | . . . |
| d. Cover air conditioner so that it will be protected from damage by high winds, water, snow, or dust and dirt. | . . . |

7-2. SHIPMENT.

This task covers:

- a. Shipment

INITIAL SETUPApplicable Configurations

All

Test Equipment

None

Special Tools

None

Materials/Parts

Packing materials
 Wood for base
 Kraft paper, plastic wrap,
 tape
 Strapping material

Equipment DescriptionsSpecial Environmental Conditions

None

General Safety Instructions

See WARNING page

References

Standard Army Procedures

Troubleshooting References

None

Personnel Required

Direct support

LOCATION/ITEM	ACTION	REMARKS
SHIPMENT	a. Bolt air conditioner to a heavy wood frame. b. Cover with plastic wrap, kraft paper etc. c. Strap covering in place. d. Mark air conditioner per standard Army Procedures.	2 x 4 or 4 x 4

APPENDIX A

REFERENCES

Fire Protection and Safety

3 5-4200-200-10

Hand Portable Fire Extinguisher for Army Users.

Lubrication

01001L

Fuels, Lubricants, Oils and Waxes.

Painting

M 43-0139

Painting Instructions for Field Use.

Maintenance

M 5-4120-367-24P

Organizational, Direct Support, and General Support
Repair Parts and Special Tools List for Air Conditioner,
Horizontal Compact, 18,000 BTU/HR

M 5-4120-367-14 HR

Hand Receipt Manual

M 38-750

The Army Maintenance Management System (TAMMS)

d. Spec. P-D-680

Dry Cleaning Solvent

Equipment and Storage

M 740-90-1

Administration Storage of Equipment

Demolition

M 750-244-3

Procedures for Destruction of Equipment to Prevent
Enemy Use

APPENDIX B

COMPONENTS OF END ITEMS LIST (COEL)

Section I. INTRODUCTION

SCOPE

Appendix lists Integral Components of and Basic (BII) for the Air Conditioner to help you determine items required for safe and efficient operation.

GENERAL

Components of end item list are divided into the following sections:

a. II. Integral Components of the End Item. These items, when assembled, comprise the Air Conditioner and must accompany it whenever it is turned in. These illustrations will help you use items.

b. III. Basic Issue Items. These are minimum items required to place the Air Conditioner in to operate it and to perform emergency repairs. Although shipped separately packed, they must accompany the Air Conditioner during operation and maintenance is transferred between accountable officers. These illustrations will assist you with hard-to-identify items. This manual is your authority to requisition items based on Table(s) of Organization and (TOE)/Modification Table of Organization (MTOE) authorization of the end item.

EXPLANATION OF COLUMNS

a. Figure Number: This column is divided as follows:

b. Figure Number. Indicates the figure number of the item on which the item is shown (if applicable).

(2) Item Number. The number used to identify item called out in the illustration.

b. National Stock Number (NSN): Indicates the national stock number assigned to the end item which will be used for requisitioning.

c. Part Number (PN): Indicates the primary number used by the manufacturer which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards and inspection requirements to identify and item or range of items.

d. Description: Indicates the federal item name and, if required, a minimum description to identify the item.

e. Location: The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code: "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes used in this list are:

CODE

USED ON

g. Quantity Required (Qty. Req'd): This column lists the quantity of each item required for a complete major item.

h. Quantity: This column is left blank for use during inventory. Under the received column, list the quantity you actually receive on your major item. The date columns are for use when you inventory the major item at a later date, such as for shipment to another site.

Section II. INTEGRAL COMPONENTS OF END ITEM

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8) Quantity			
(a) Figure No.	(b) Item No.	National Stock Number	Part No. & FSCM	Description	Location	Usable On Code	Qty Reqd	Rcv'd	Date	Date	Date
		5340-01-042-5759	13216E6137 (97403)	Mount, Resilient			8				
		4720-01-038-2334	13216E6153 (97403)	Tube, Elastomeric			4				
		5310-00-566-9504	13216E6138-2 (97403)	Washer			4				
		5305-00-269-2807	MS90726-64	Screw, Cap, Hex HD			4				

Section III. BASIC ISSUE ITEMS

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8) Quantity			
(a) Figure No.	(b) Item No.	National Stock Number	Part No. & FSCM	Description	Location	Usable On Code	Qty Reqd	Rcv'd	Date	Date	Date
		5220-00-559-9618		Case, Manual Department of Army Technical Manual; Operator, Organiza- tional, and Direct and General Support Main- tenance Manual. TM 5-4120-367-14 Department of Army Technical Manual; Organizational, Direct Support and General Support Repair Parts and Special Tools List for Air Conditioner, Horizontal Compact, 18,000 BTU/HR.			1				

APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists expendable supplies and materials you will need to operate and maintain the Air Conditioner. These items are authorized to you by CTA50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS.

a. Column 1—Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use Coater, Air Filter, Item 1, Appendix C").

b. Column 2—Level. This column identifies the lowest level of maintenance that requires the listed item. (enter as applicable):

C-- Operator/Crew F-- Direct Support
O--Organizational Maintenance
Maintenance H--General Support
Maintenance

c. Column 3—National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4—Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturers (FSCM) in parenthesis, if applicable.

e. Column 5—Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirement.

Section II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1)	(2)	(3)	(4)	(5)
		National		

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

GENERAL.

on provides a general explanation of all and repair functions authorized at various levels.

aintenance Allocation Chart (MAC) in designates overall responsibility for the of maintenance functions on the identified component. The implementation of the functions upon the end item or component is consistent with the assigned maintenance

l lists the special tools and test equipment each maintenance function as referenced l.

V contains supplemental instructions on notes for a particular maintenance function.

MAINTENANCE FUNCTIONS.

To determine the serviceability of an item its physical, mechanical and/or electrical with established standards through

verify serviceability and detect incipient measuring the mechanical or electrical of an item and comparing those with prescribed standards.

Operations required periodically to keep an er operating condition, i.e., to clean e), to preserve, to drain, to paint, or to lubricants, hydraulic fluids, or compressed

To maintain, within prescribed limits, by proper or exact position, or by setting the characteristics to specified parameters.

to adjust specified variable elements of an about optimum or desired performance.

To determine and cause corrections to be adjusted on instruments or test measuring

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), and item or system.

j. Overhaul. That maintenance effort (services/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

D-3. COLUMN ENTRIES USED IN THE MAC.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see

maintenance levels, appropriate work time figures will be shown for each level. The number of man-hours specified by the work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition. The symbol designations for the various maintenance levels are as follows:

C Operator or crew
 O Organization maintenance
 F Direct support maintenance
 H General support maintenance
 D Depot maintenance

e. *Column 5, Tools and Equipment.* Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. *Column 6, Remarks.* This column shall contain a letter code in alphabetical order which shall be keyed to the remarks contained in Section IV.

D-4. COLUMN ENTRIES USED IN TOOL AND TEST EQUIPMENT REQUIREMENTS

a. *Column 1, Tool or Test Equipment Reference Code.* The tool and test equipment reference code correlates with a maintenance function on the identified end item or component.

b. *Column 2, Maintenance Level.* The lowest level of maintenance authorized to use the tool or test equipment.

c. *Column 3, Nomenclature.* Name or identification of the tool or test equipment.

d. *Column 4, National/NATO Stock Number.* The National or NATO stock number of the tool or test equipment.

e. *Column 5, Tool Number.* The manufacturer's part number.

D-5. EXPLANATION OF COLUMNS IN SECTION IV.

a. *Reference Code.* The code scheme recorded in column 6, Section II.

b. *Remarks.* This column lists information pertinent to the maintenance function being performed as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
01	FINAL ASSEMBLY								
	Connectors	Inspect Replace		0.5 2.0					
	Capacitors	Inspect Test Replace		0.5 0.5 2.0					
	Information Plates	Inspect Service Replace	.05 .05	1.0					
	Installation Hardware	Inspect Replace		0.5 0.5					

MAINTENANCE ALLOCATION CHART (CONTINUED)

(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
		C	O	F	H	D		
Panels	Inspect Service Repair Replace	0.5	0.5	2.0 1.0				(Replace Gasket and Insulation)
Grilles (Louvers)	Inspect Adjust Service Replace	0.5 0.2 0.5		1.0				(Include operating Instructions)
Screens and Guards	Inspect Service Replace	0.5 0.5		0.5				
Information Plates	Inspect Service Replace	0.2 0.2		0.5				
AIR CIRCULATING AND CONDENSATE DRAIN SYSTEM								
Air filters	Inspect Service Replace	0.5	0.5 1.0					
Mist Eliminator	Inspect Service Replace		0.5 0.5 1.0					
Condenser Discharge Louver linkage	Inspect Service Adjust Replace		0.5 1.0 1.0 2.0					
Fresh Air Damper and Actuator	Inspect Service Adjust Replace		0.5 0.5 0.5 2.0					
Condensate Traps and	Inspect	0.5	0.5					

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	04 Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
04	ELECTRICAL								
	Control Module	Inspect	0.5						
		Adjust	0.5						
		Test		2.0					
		Repair		2.0					
		Replace		2.0					
	Junction Box	Inspect		0.5					
		Service		0.5					
		Test		2.0					
		Repair		2.0					
		Replace		2.0					
	Wiring Harness	Inspect		0.5					
		Test		0.5					
		Repair		2.0					
		Replace		4.0					
	Transformer	Test		0.5					
		Replace		1.0					
	Rectifier	Test		0.5					
		Replace		1.0					
	Condenser Fan Thermostat and Cable Assembly	Inspect		0.5					
		Test		1.0					
		Replace		1.0					
05	EVAPORATOR FAN, MOTOR AND HEATER								
	Fan and Housing	Inspect		0.5					
		Service		1.0					
		Replace			2.0				
	Motor	Inspect		0.5					
		Service		0.5					
		Test		0.5					
		Repair			2.0				
		Replace			3.0				
								(Replace Bearings and Elec. Connector only)	

MAINTENANCE ALLOCATION CHART (CONTINUED)

(2) Component /Assembly	(3) Maintenance Function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
		C	O	F	H	D		
CONDENSER FAN, MOTOR AND LOUVER ACTUATING CYLINDER								
Fan and Housing	Inspect		0.5				(Replace Bearings and Elec. Connector only)	
	Service		0.5					
	Replace			1.0				
Motor	Inspect		0.5					
	Test		0.5					
	Repair			2.0				
	Replace			3.0				
Actuating Cylinder	Inspect		0.5					
	Adjust			1.0				
	Replace			1.0				
REFRIGERATION SYSTEM								
Evaporator Coil	Inspect		0.5				(Coil only) (Replace Coil only)	
	Service		0.5					
	Replace			8.0				
Expansion Valves	Test			0.5				
	Adjust			1.0				
	Replace			2.0				
Pressure Switches	Test			0.5				
	Replace			1.0				
Condenser Coil	Inspect		0.5					
	Service		0.5					
	Repair			8.0				
Solenoid Valves	Test			0.5				
	Repair		1.0					
	Replace			1.5				
Liquid Indicator	Inspect	0.5						

MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
08	HOUSING Housing	Inspect Service Replace						0.5 0.5 2.0	(Replace Insulation & Lifting Hand)

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Refer- ence Code	(2) Mainten- ance level	(3) Nomenclature	(4) National/NATO stock number	(5) Tool number
		<p>No special tools and test equipment required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II:</p> <p>Tool Kit, service, refrigeration Unit (SC 5180-90-CL-N18)</p> <p>Soldering Gun Kit</p>	<p>5180-00-596-1474</p> <p>3439-00-930-1638</p>	

APPENDIX E

TORQUE LIMITS

Appendix lists standard torque values and provides general information and methods for applying torque. Special values and sequences are indicated in the maintenance procedures for applicable components.

Thread Size	Minimum Breakaway Torque (In.-Lbs.)	Thread Size	Minimum Breakaway Torque (In.-Lb 1)
10-32	2.0	5/8-18	32.0
1/4-28	3.5	3/4-16	50.0
5/16-24	6.5	7/8-14	70.0
3/8-24	9.5	1-12	90.0
7/16-20	14.0	1-1/8-12	117.0
1/2-20	18.0	1-1/4-12	143.0
9/16-18	24.0		

NOTE

To determine breakaway torque, thread nut onto screw or bolt until at least two threads stick out. Nut shall not make contact with a mating part. Stop the nut. Torque necessary to begin turning nut again is the breakaway torque. Do not reuse selflocking nuts that do not meet minimum breakaway torque.

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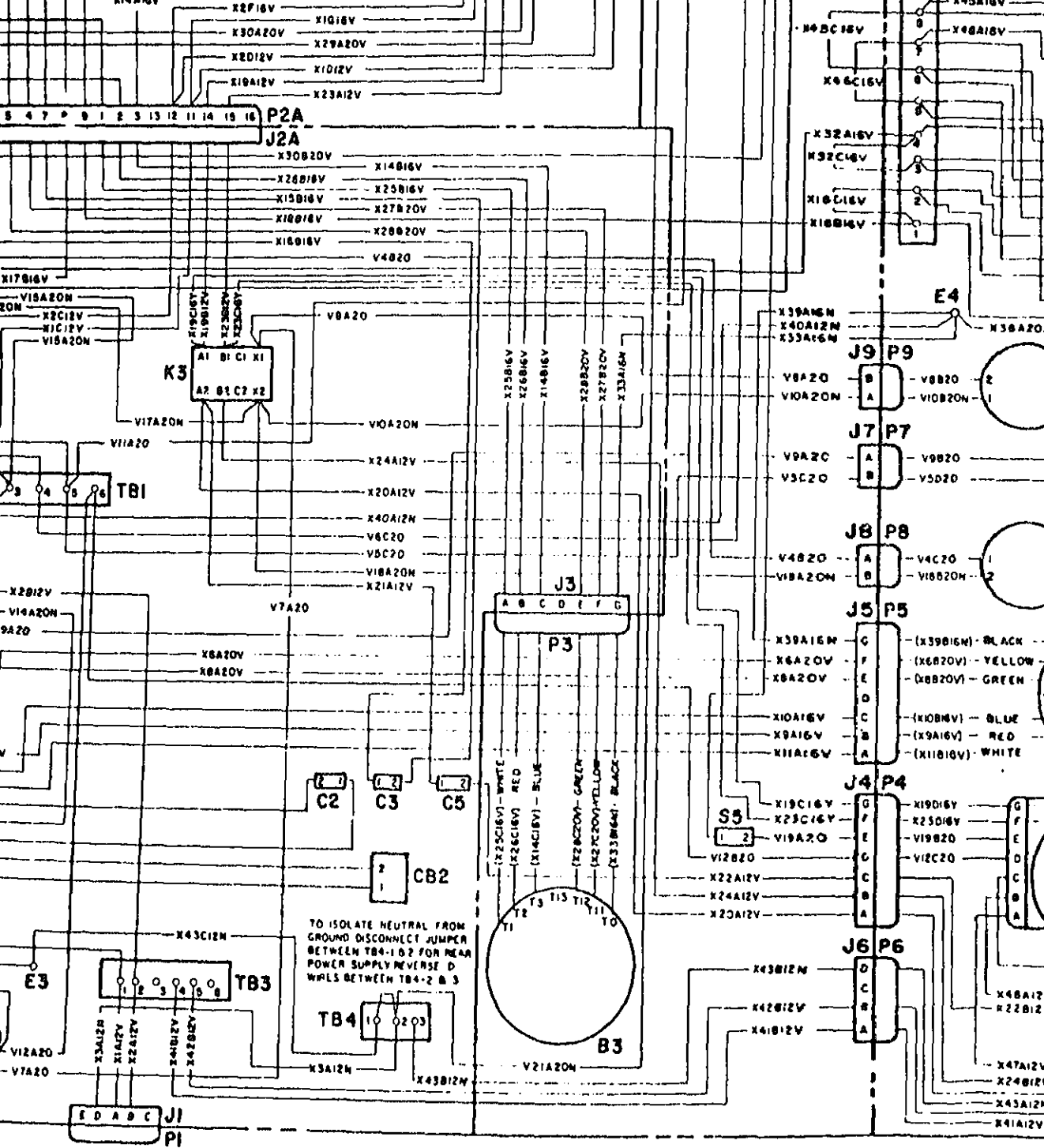
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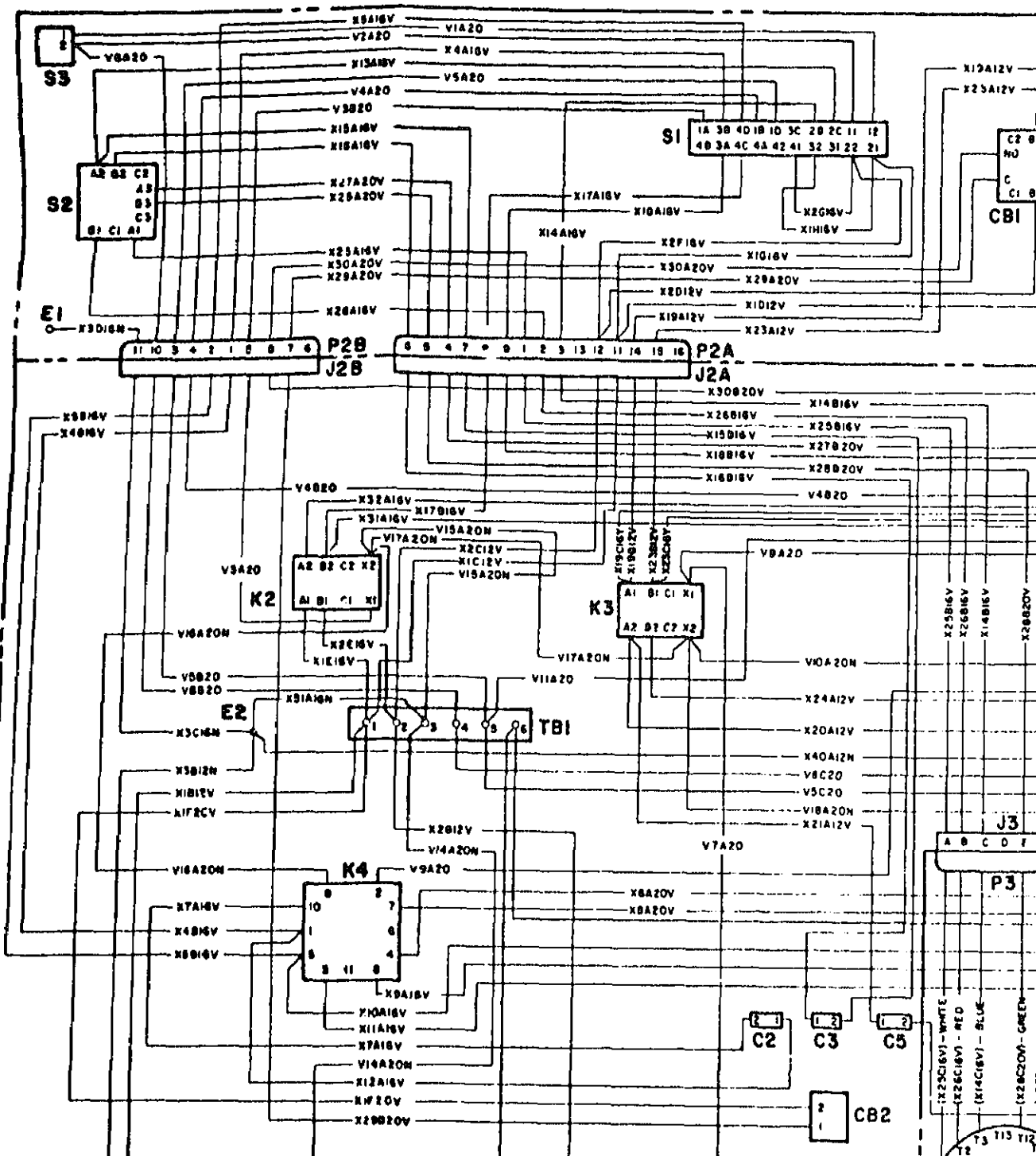
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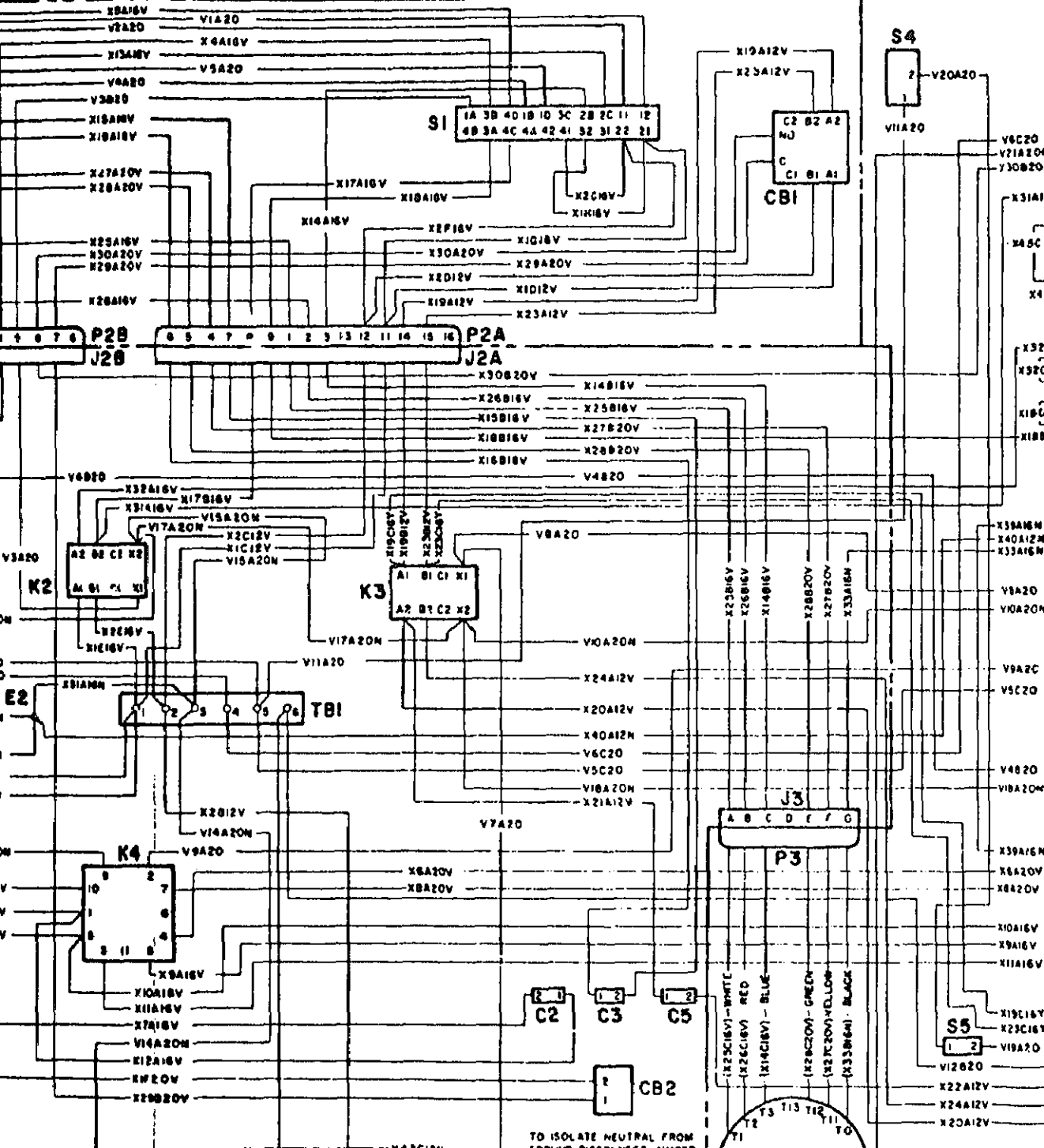
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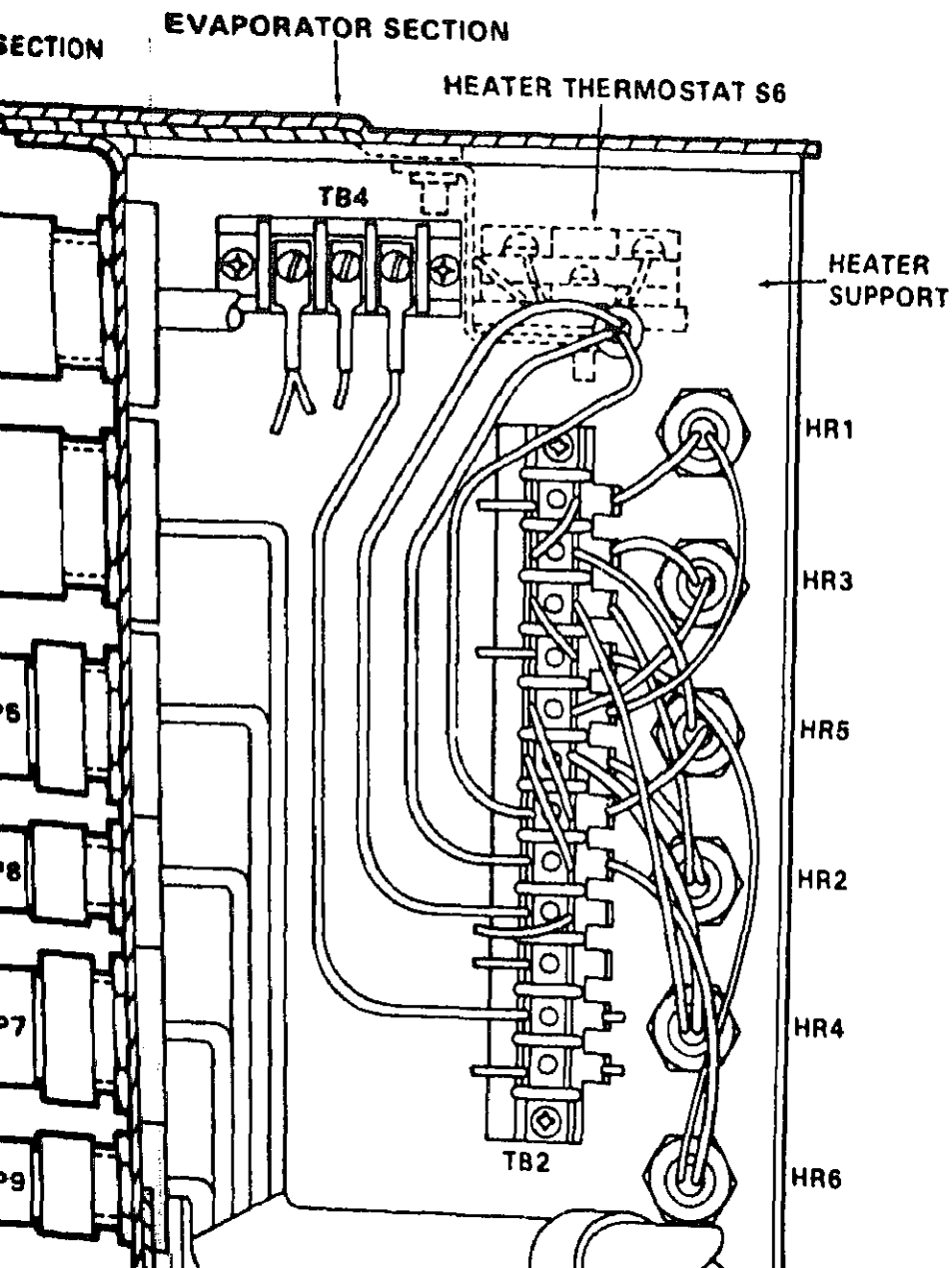
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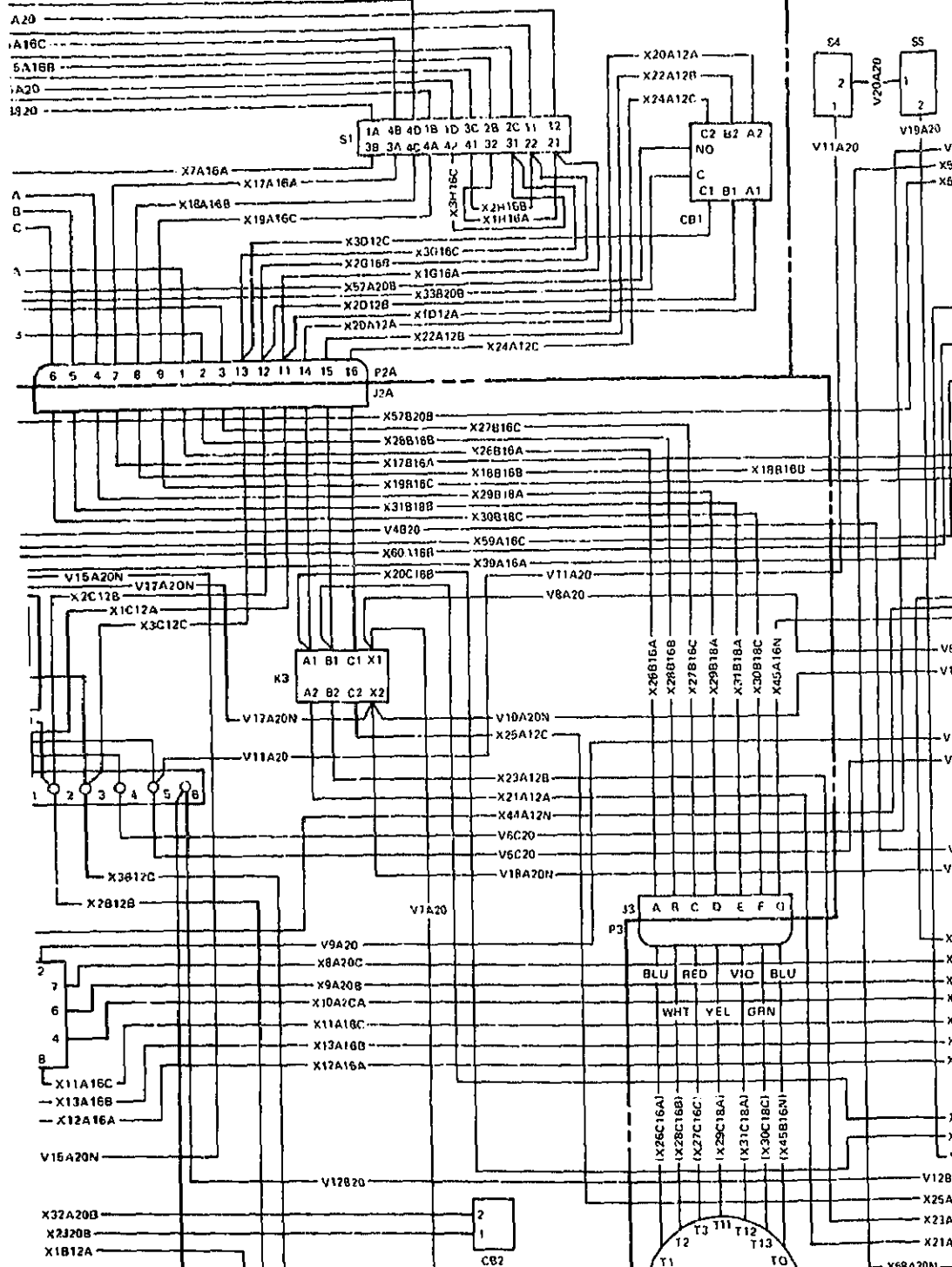


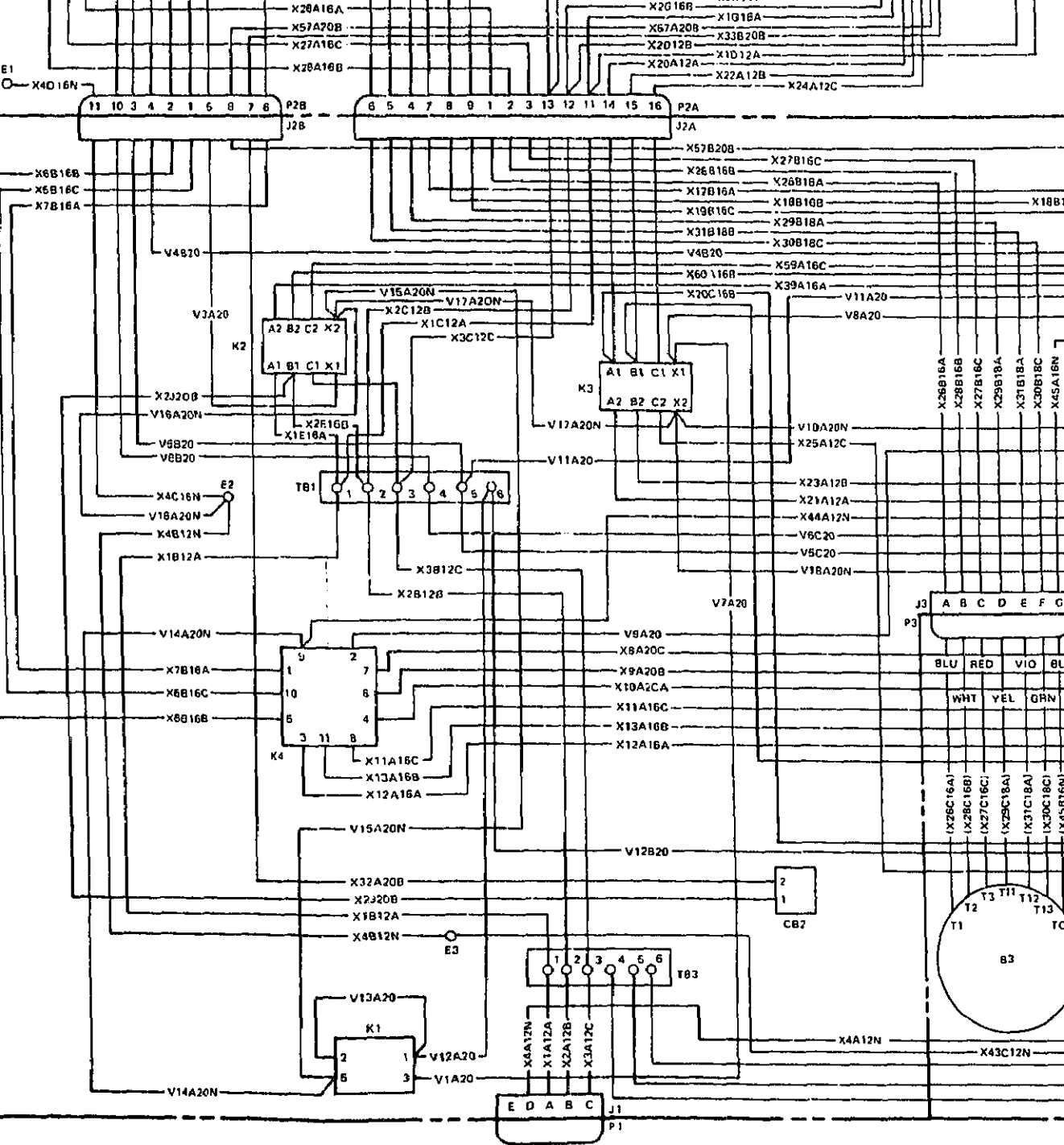


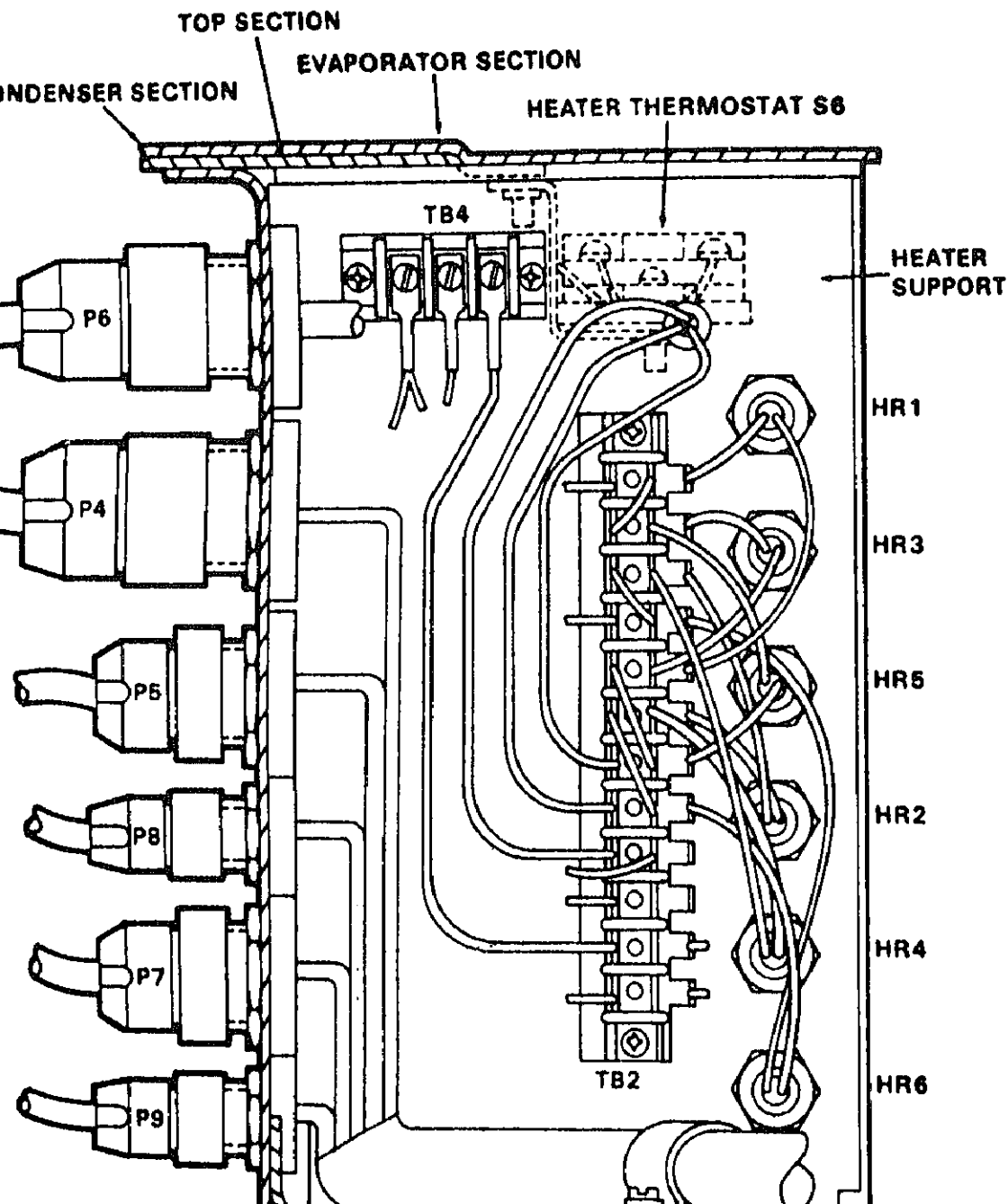


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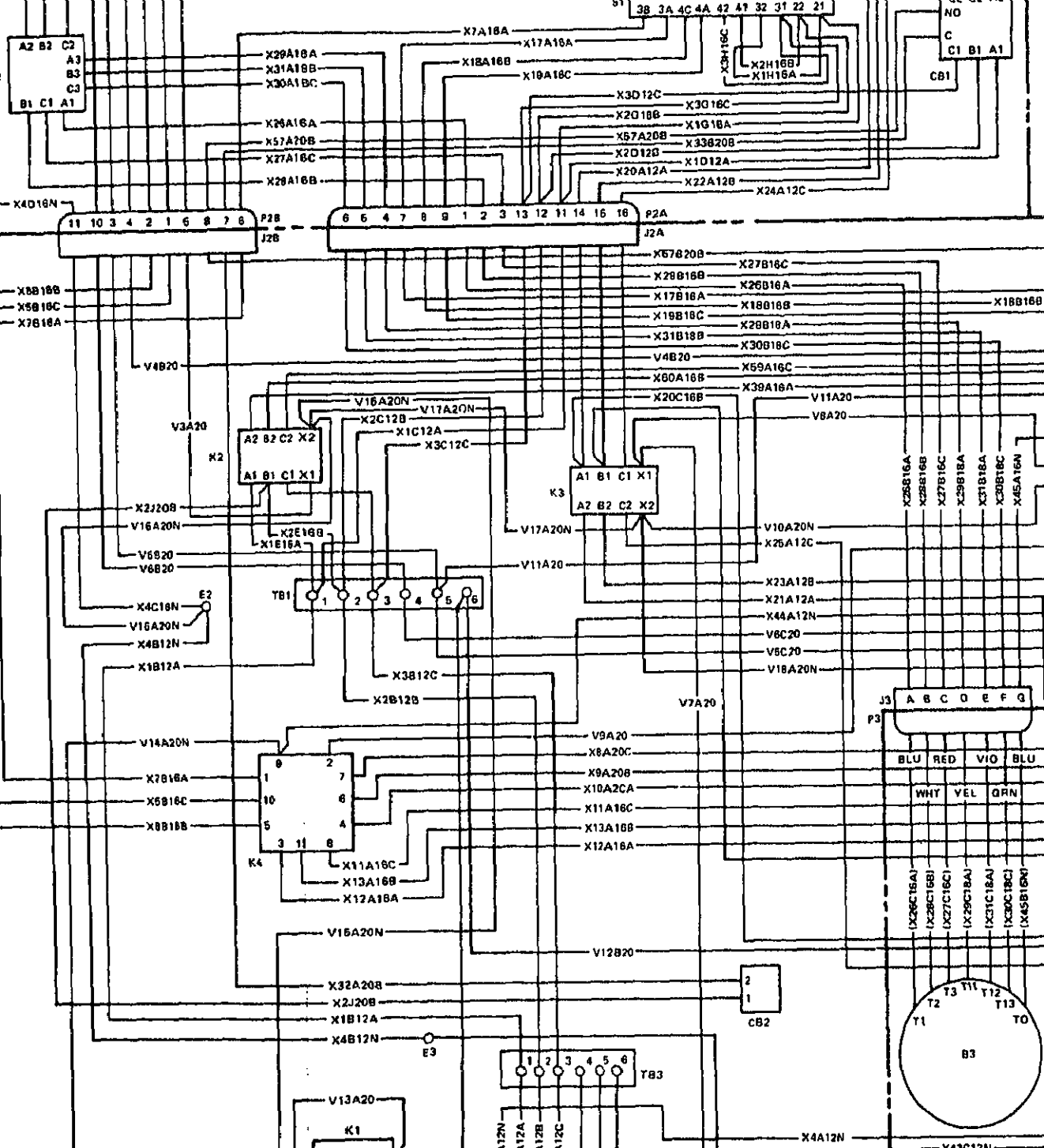




PART OF
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FAN MOTOR
B2

PART OF
SOLENOID
VALVE
L1

PART OF
SOLENOID
VALVE
L2



HER SECTION

HEATER THERMOSTAT S6

P6

TB4

HEATER
SUPPORT

P4

HR1

HR3

PART OF
CONDENSER
FAN MOTOR
B2

P5

HR5

P8

HR2

PART OF
SOLENOID
VALVE
L1

P7

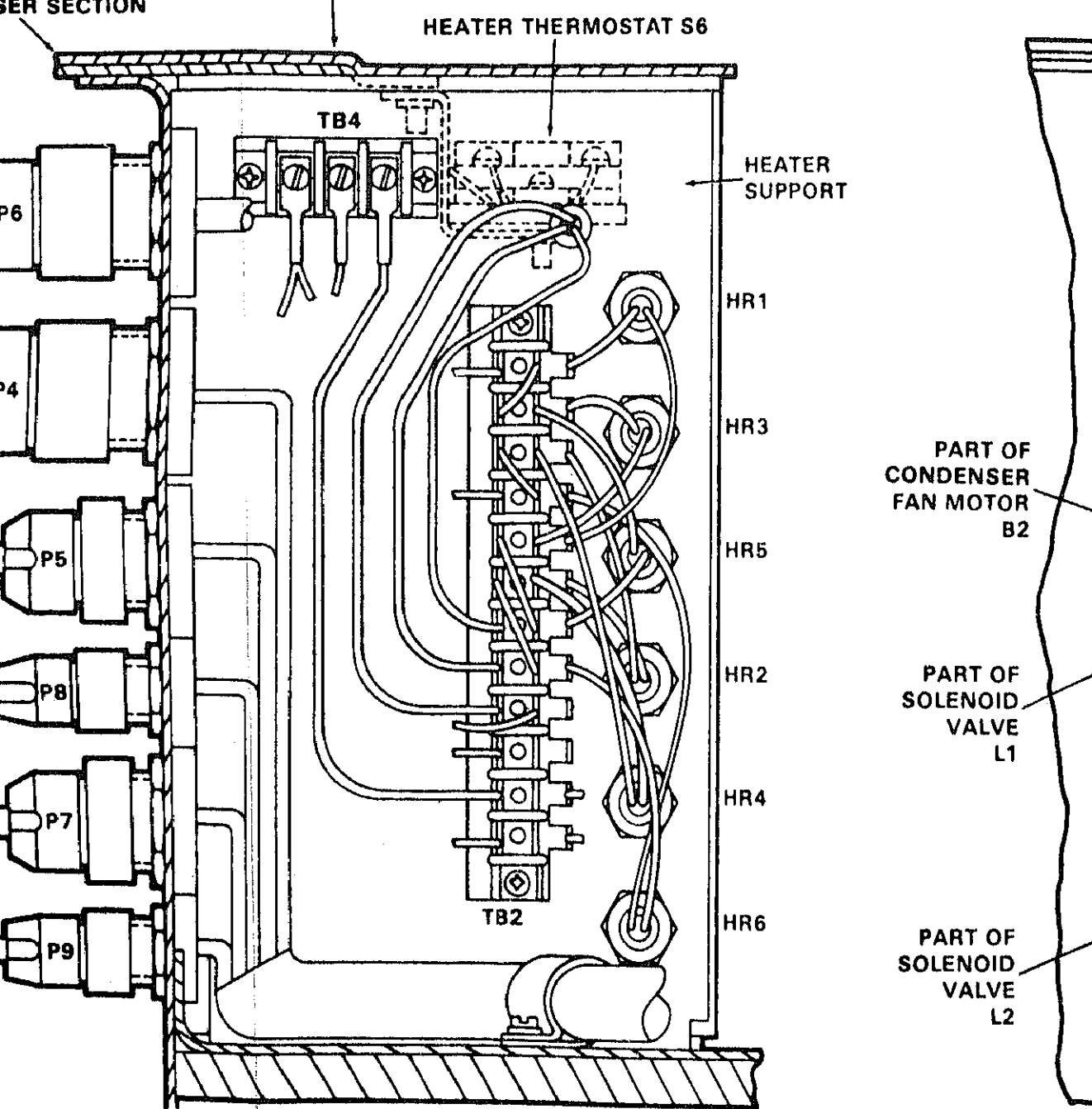
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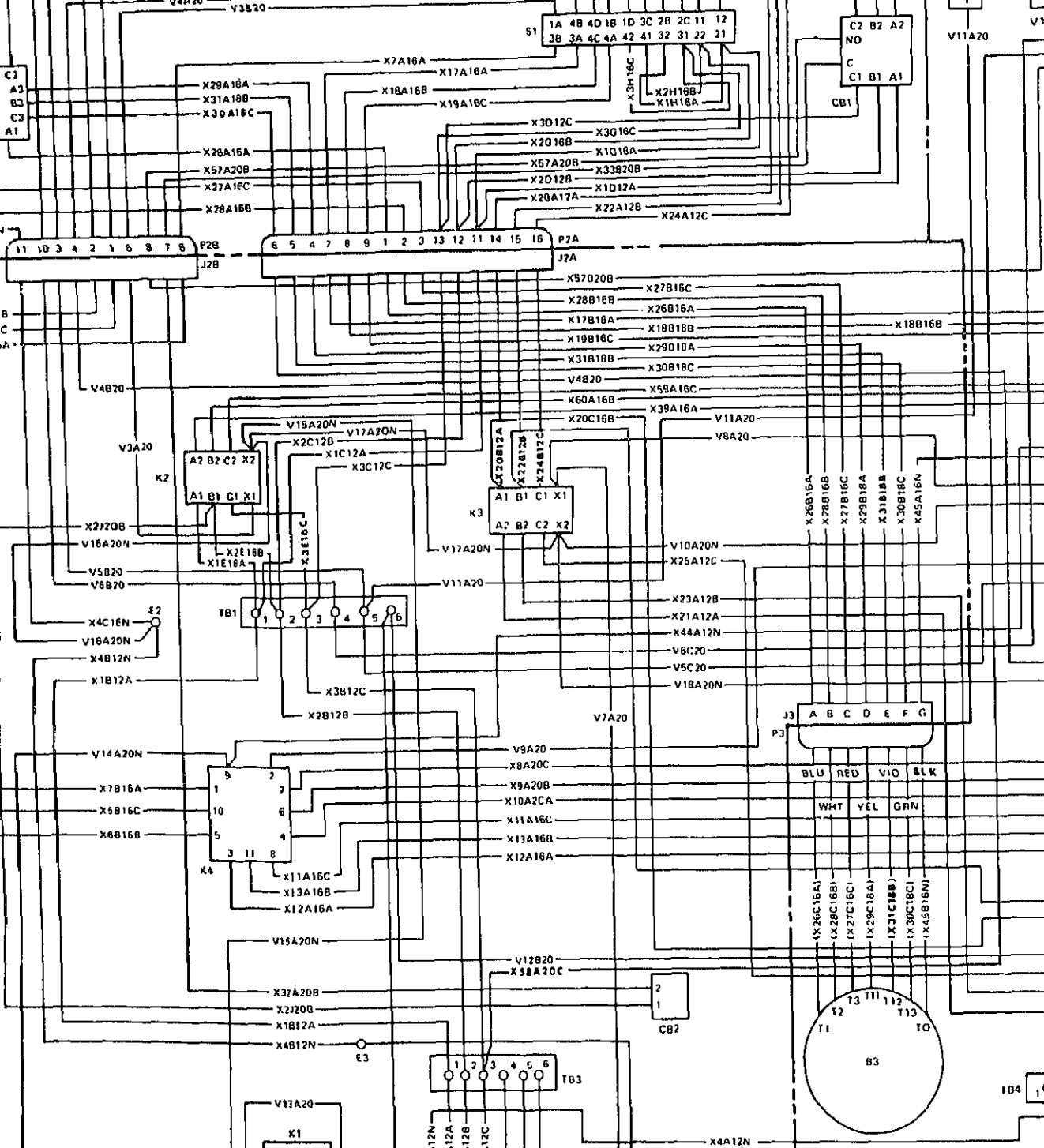
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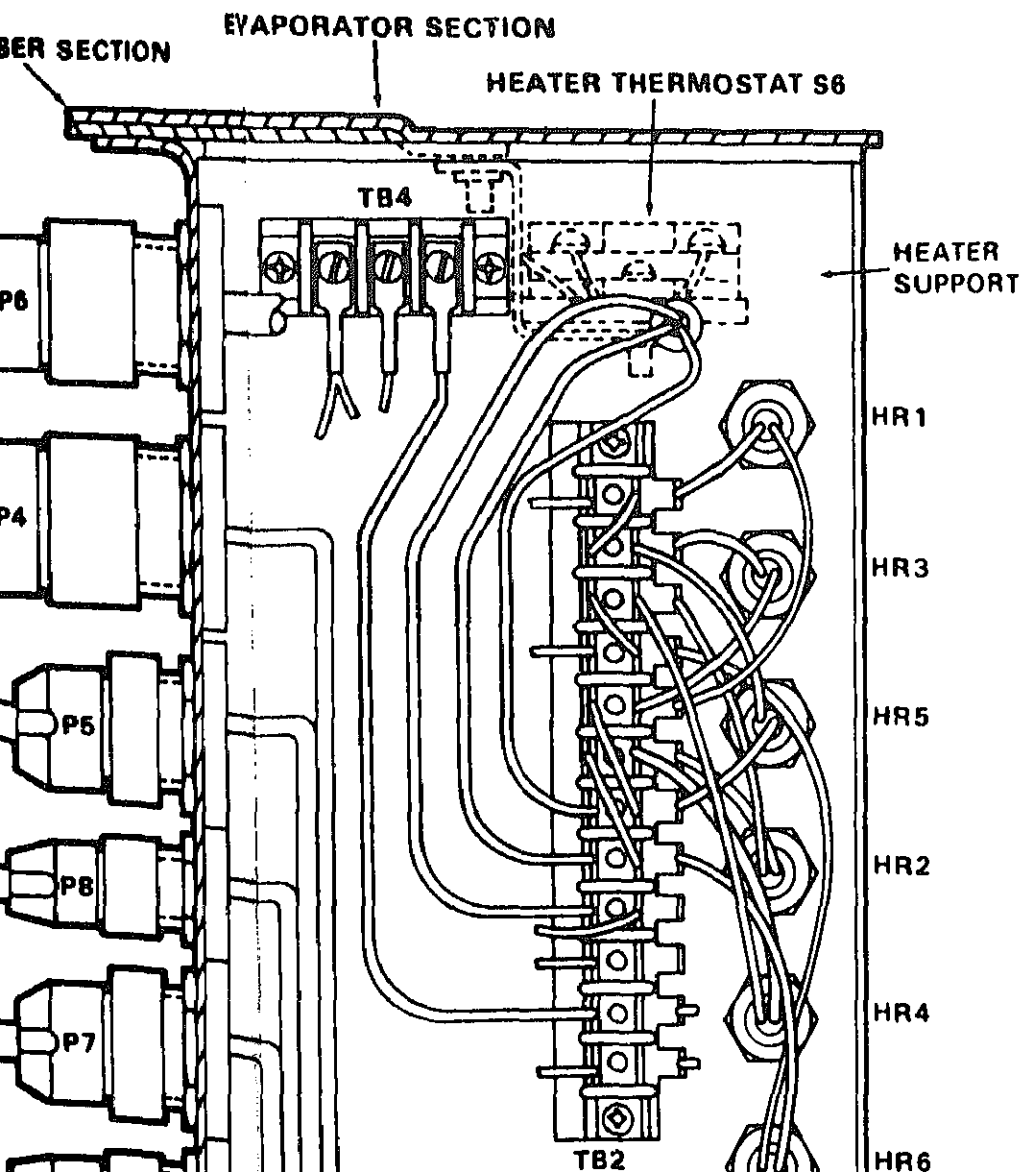
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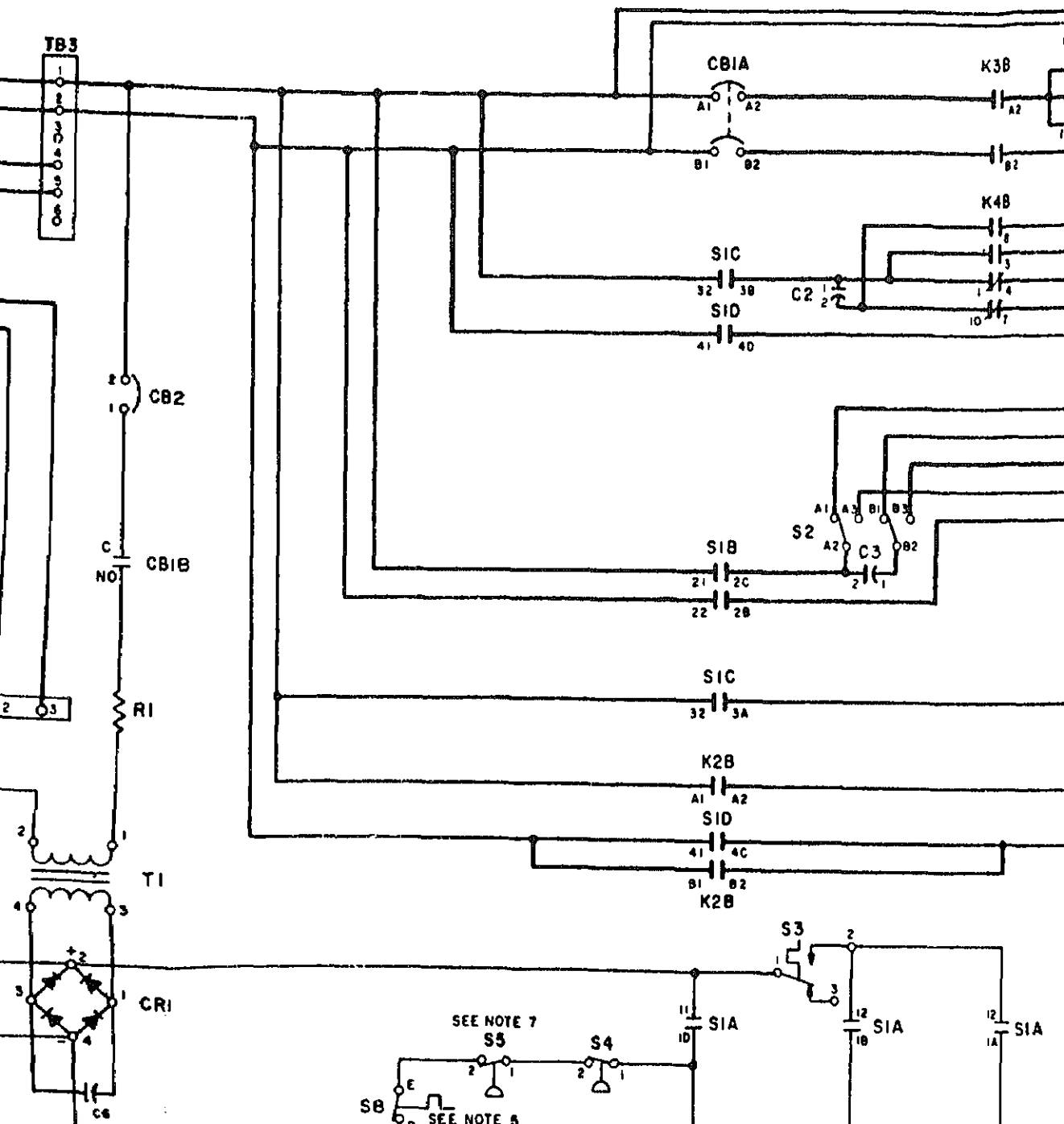
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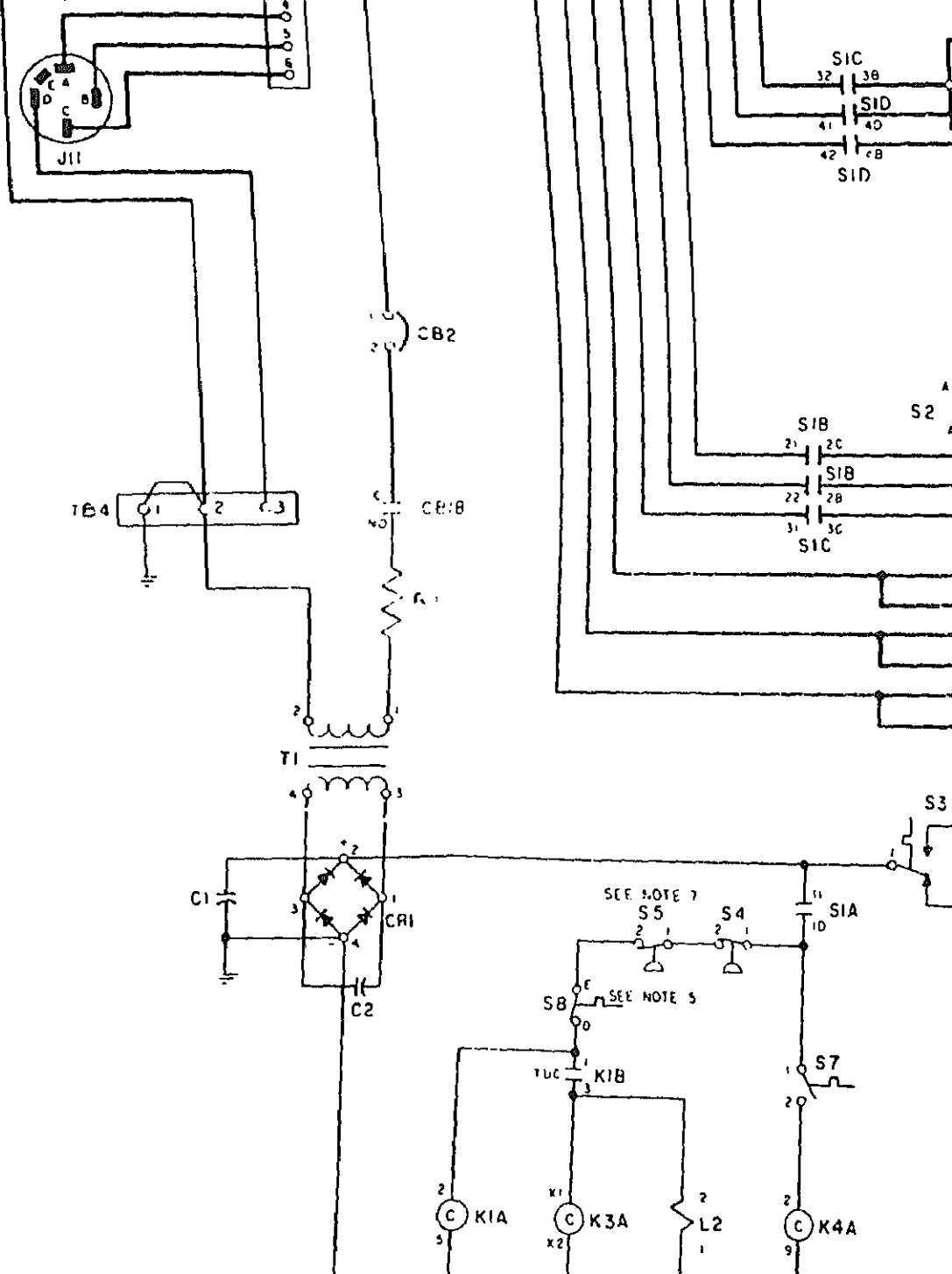
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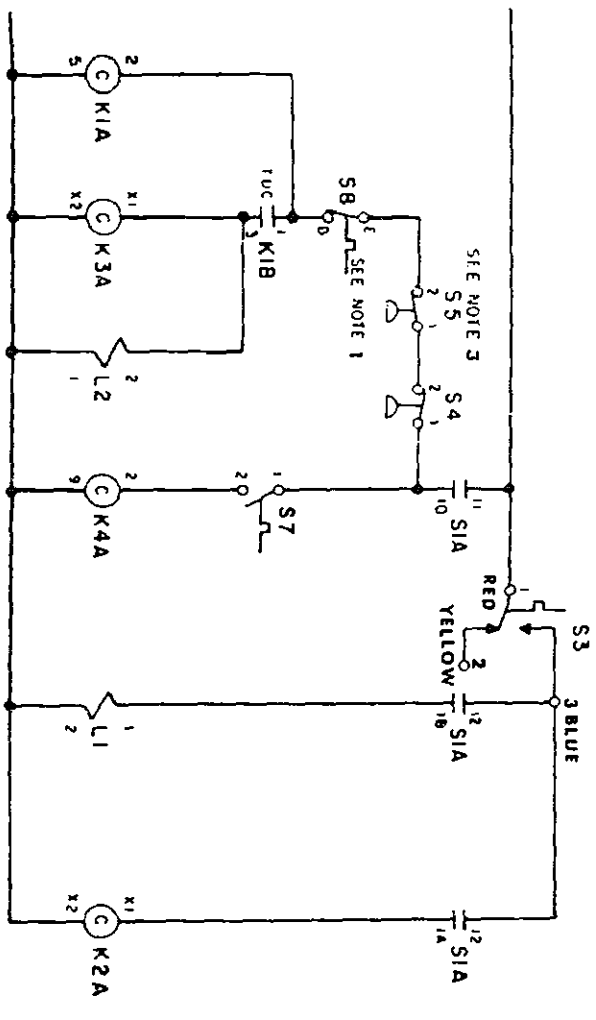
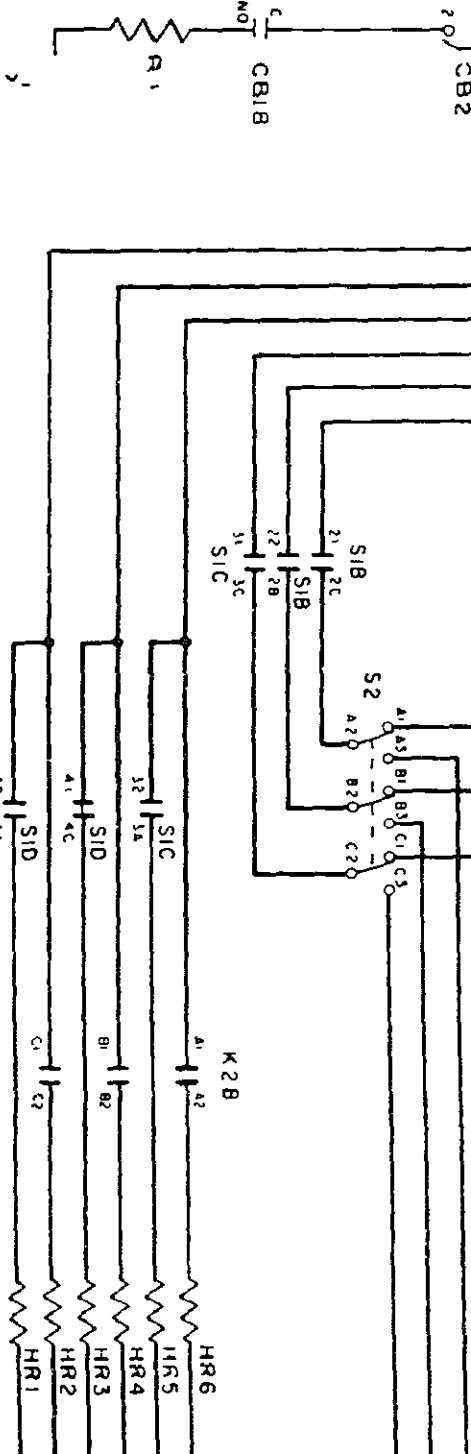












SELECTOR SWITCH POSITION	SWITCH FUNCT
1	HEA (HIG)
2	HEA (LOV)
3	OFF
4	VEN
5	COG

By Order of the Secretary of the Army:

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

RECOMMEND

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THEN...JOT DOWN
DOPE ABOUT IT ON
FORM, TEAR IT OUT
IT AND DROP IT IN
MAIL!

PUBLICATION NUMBER

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REV

The Metric System

Linear Measure

1 millimeter = 10 millimeters = .39 inch

1 centimeter = 10 centimeters = 3.94 inches

1 decimeter = 10 decimeters = 39.37 inches

1 meter = 10 meters = 32.8 feet

1 dekameter = 10 dekameters = 328.08 feet

1 hectometer = 10 hectometers = 3,280.8 feet

Weights

1 milligram = 10 milligrams = .15 grain

1 centigram = 10 centigrams = 1.54 grains

1 decigram = 10 decigrams = .035 ounce

1 gram = 10 grams = .35 ounce